# MINING WORLD

OCTOBER 1955 VOL. 17, NO. 11

Wah Chang's Know-How At Lincoln Tungsten

Howdy Podner – Here's A Preview of Las Vegas

*Highland Plant Recovers Titanium Minerals*
*Page 52*

50 cents a copy—3s 6d in sterling

# No long stops to switch drill steels with TIMKEN® interchangeable rock bits

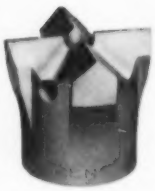
*Dozens of different Timken multi-use and carbide insert bits fit the same drill steel!*

YOU end costly drilling delays in switching steels when you change to Timken® multi-use and carbide insert bits.

Just unscrew one type of Timken bit and screw another on the same drill steel, right on the job. Makes it easier for the driller to change to the most economical bit as the ground changes. You also eliminate expensive drill steel inventories because dozens of different Timken multi-use and carbide insert bits *are interchangeable on the same steel.*

Both types of Timken bits are made from electric furnace Timken alloy steel, have a special shoulder union that keeps drilling impact from damaging threads.

Our expert rock bit engineers will be happy to help you solve your drilling problems. Just write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



**WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS**

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

**WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS**

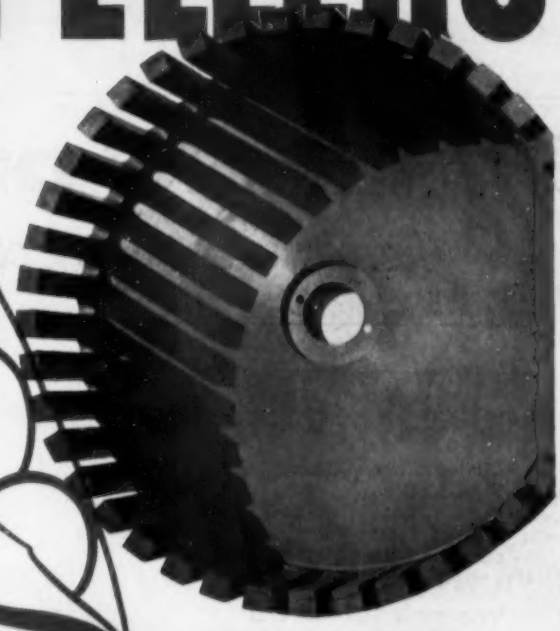
Give highest speed through hard, abrasive ground. Also most economical for constant-gauge holes, small-diameter holes, very deep holes.

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

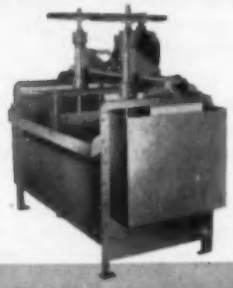
***... your best bet for the best bit ... for every job***

# As like as peas in a pod!
# NEW Pressure-Molded
# (RUBBER COVERED) IMPELLERS



The rubber covering of the metal core of the AGITAIR® impeller is now molded in a single power pressure operation. The result is a new degree of uniformity never before achieved and a speed-up in production that enables us to meet the ever-increasing demand for the world-famed . . .

## AGITAIR® FLOTATION MACHINE



The marked improvement in the impeller—heart of AGITAIR® —results in a greater uniformity of operation and insures longer life before repairs or replacements are required.

Keep your metallurgy up to date by installing AGITAIR® —the machine that is progressively improved by laboratory experiment and mill experience. Write for details.

**Other Galigher Products**

Commercial and Laboratory AGITAIR®
Acid-proof Sump Pumps
Laboratory Ball Mills
Geary-Jennings Sampler
Geary Reagent Feeder
Laboratory Pressure Filters

*Leaders in Experience & Service*

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PLANT DESIGN • GEOLOGIC INVESTIGATION

Home Office: P. O. Box 209 Salt Lake City 10, Utah
Eastern Office: 921 Bergen Ave. (Room 721) Jersey City 6, N.J.

# No long stops to switch drill steels with TIMKEN® interchangeable rock bits

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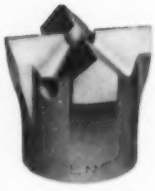

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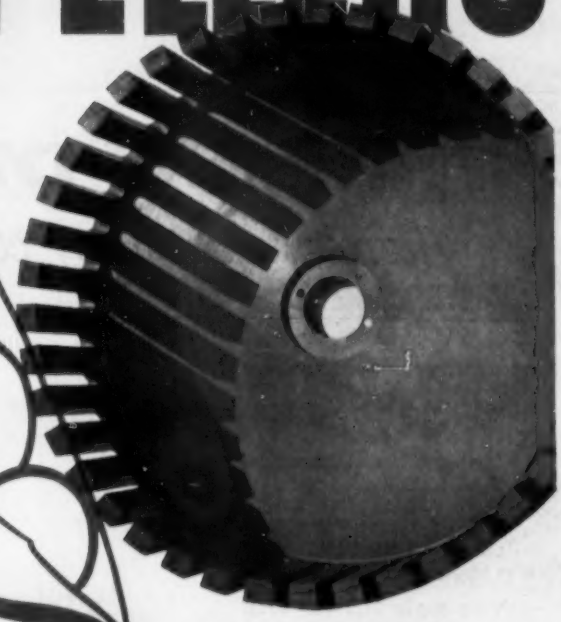

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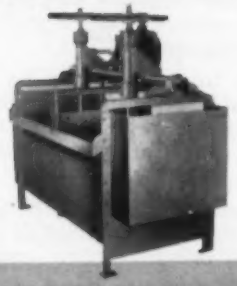

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# THE NEW D7, D8 and D9

## *here's what they can mean on your job*

**The new 286-HP CAT® D9 Tractor**

Choice of torque converter or oil clutch drive. First track-type tractor with Turbocharger. Completely new 286-HP engine. "Live-shaft" drive for rear-mounted equipment. Many other important features.

**The new 191-HP D8**

With torque converter (Series D). With exclusive oil clutch drive (Series E). Completely new 191-HP engine. "Live-shaft" drive for rear-mounted equipment independent of flywheel clutch. New easy-working controls. Many other improvements.

**The new 128-HP D7 Series C**

Gear-type balancer gives six-cylinder smoothness. New 128-HP engine. Drawbar pull now 28,700 lb. maximum. New starting engine for simpler, easier operation. Track shoes hardened by "water quench" process. And many other important advances.

The year's biggest news on tracks: Caterpillar's three great new Diesel Tractors.

They're big news because they give you greater power and better performance than ever before.

The D9 and D8, for example, give you your choice of torque converter or exclusive oil clutch drive so you can best match your machine to your own job requirements.

All three give you features like one-piece frame-steering clutch case assemblies, and track shoes specially hardened by a new "water quench" process which means longer shoe life.

All three are easier to operate, with simpler, more powerful starting engines, easier working controls and other improvements.

They're easier to service, too; an exclusive trouble-free oil clutch, separately removable power train components and a fuel system that needs no adjustments in the field are only three of many reasons why.

Better be sure you get *all* the news about the new D7, D8 and D9. Call your Caterpillar Dealer today. Or mail the coupon below.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U. S. A.

**CATERPILLAR***

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

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**CATERPILLAR TRACTOR CO., Peoria, Illinois, U.S.A.**

I'd like *all* the big news about the new D7, D8 and D9.

*Name* _____

*Company* _____

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*City* _____ *Zone* ____ *State* _____

**THE NEW D9, D8 AND D7 —EXAMPLES OF CATERPILLAR LEADERSHIP IN ACTION**

# Mining World

*Including the Export Edition* **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 17 **OCTOBER 1955** No. 11

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COVER PICTURE: Humphreys Gold Corporation is operating this dredge at E. I. du Pont de Nemours and Company's new Highland titanium plant at Lawtey, Florida. This cutter head suction dredge digs 1,000 tons of sands hourly from a maximum depth of 50 feet.

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MILLER FREEMAN PUBLICATIONS

## GRAB SAMPLES From the Mail

**Correct Nicaro Ownership**

Dear Sir:

Your Catalog, Survey and Directory Number, 1955, included on page 89 a review of nickel production in Cuba which contained a misstatement which, for the record, I should like to correct.

Paragraph two of the article stated: "The U.S. Government set aside $43,000,000 for expansion of it's leased (from Freeport Sulphur Co.) mines. (The U.S. had already invested $60,000,000 in the mines)."

The appropriation for the Nicaro expansion program is not for the expansion of the mines but for the expansion of the metallurgical plant, which is the property of the U.S. Government. The Government does not lease the mines, which are owned by Nicaro Nickel Company, a subsidiary of Freeport Sulphur Company, but is purchasing ore from Nicaro Nickel under contract.

At the time the Nicaro project was undertaken and for some years thereafter, the Government owned preferred stock in Nicaro Nickel. However, in 1954, the last of this preferred stock was redeemed, and Freeport now owns all the capital stock of Nicaro Nickel.

John C. Carrington
Vice President
Freeport Sulphur Company
New York, New York

**Cover: Pro and Con**

Dear Sir:

Just a note to let you know I think your magazine is growing in stature and becoming a real piece of work with honest information for the mining industry. I particularly wish to compliment you on the removal of the advertising from the front page.

With further reference to this front page advertising, in the past, when the magazine arrived I began to think that I had received another trade journal. Not that I have anything at all against the particular manufacturer; only I believe the magazine makes a much better impression without any advertising on the front page.

I also like the idea of binding the magazine so that the back portion is square across.

O. W. Walvoord
O. W. Walvoord, Inc.
Denver, Colorado

Dear Sir:

Sorry but I cannot agree with the affluent praise you gave your own new magazine cover. My first impression when I recently received the latest issue of the Mining World was: "Where did this old issue come from." The improvement that was made was just what you said, namely, that was to remove the timely advertisement and put on the cover what might be found within, but the improvement has certainly gone to naught when the style of type was chosen for the title. I am neither a printer nor a publisher, merely an avid reader, but the archaic type on the cover seems to be alien from the newsworthy inside material. I have

*Continued on page 86*

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## OVER MILLION YARDS OF SOLID ROCK MOVED FOR TAIL RACE

Moving more than a million yards of rock for the tail race of a southern dam is a typical job for a MARION 151-M.

BIG jobs in HARD digging are common assignments for the MARION 151-M. A reputation for big production on mining projects throughout the world makes this 7-yard shovel a logical choice for the toughest construction jobs.

Ask for Bulletin 393 which shows some of the many design and construction features of the 151-M that make these performance records possible.

**MARION** / MARION POWER SHOVEL COMPANY
MARION, OHIO, U. S. A.

POWER SHOVELS FROM ½ TO 60 CUBIC YARDS • DRAGLINES • CLAMSHELLS • LOG LOADERS
PILE DRIVERS • WALKING DRAGLINES • CRANES, CRAWLER & RUBBER MOUNTED • BACKHOES

The two 6-cell No. 18 Special Denver "Sub-A" Flotation Machines at Arizona Barite Co. Larry Mathis, Mill Superintendent, adjusts the pulp level in each cell by hand-operated weir gates.

# Arizona Barite Co. has replaced no parts on Denver "Sub-A's" in operation since 1948

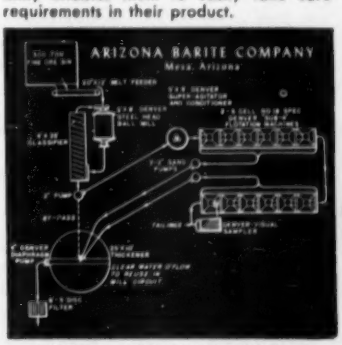
"Arizona Barite Co., Mesa, Ariz., installed a 6-cell No. 18 Special (32 x 32) Denver 'Sub-A' Flotation Machine in June, 1948, for roughing. At the same time, we added a second 6-cell No. 18 Special Denver 'Sub-A' Flotation Machine for cleaning. Due to the conditions of the ore, this setup was not practical, so the 'flexibility' feature of the Denver 'Sub-A' Machines was used to hook them in tandem.

"Since the original installation, no wearing parts have been replaced after 47,450 hours of continuous operation. The only maintenance has been replacement of V-belts and lubrication. We estimate another two years' wear on impellers before replacement is necessary."—Larry Mathis, Mill Superintendent.

This is a specific example of one of the reasons why mill operators depend upon Denver "Sub-A" Flotation Machines for hard, continuous operation, as well as high metallurgical efficiency. The same high profit operation is available to you.

If you are interested in the low maintenance features and metallurgical efficiency features of Denver "Sub-A" Flotation Machines, write for DECO Bulletin No. F10-881. If you are interested in the complete story on "Benefication of Barite at Arizona Barite Company," write for Engineering Notebook Bulletin No. M4-B56.

An interesting note here is that the Denver "Sub-A" Flotation Machines are operated in series and each cell produces a finished $BaSO_4$ product without cleaning or recleaning, due to the selective action of the Denver Flotation Machine. A higher grade product can easily be made by cleaning the concentrate. Part of the present cells could be devoted to the cleaning action when necessary. This flexibility enables them to easily take care of any changing requirements in their product.




DENVER MACHINES PAY OFF

*

*The Denver Visual Sampler, installed at the tail end of the flotation section, paid for itself in two weeks.

*"The firm that makes its friends happier, healthier and wealthier"*

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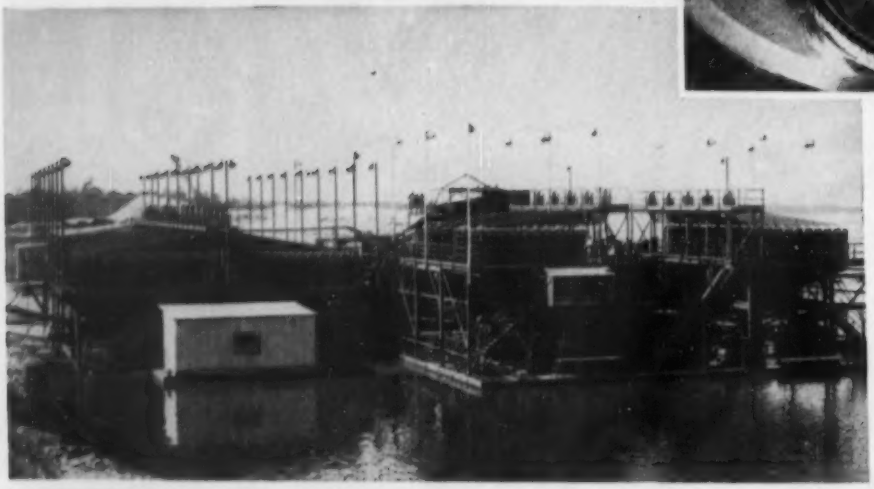
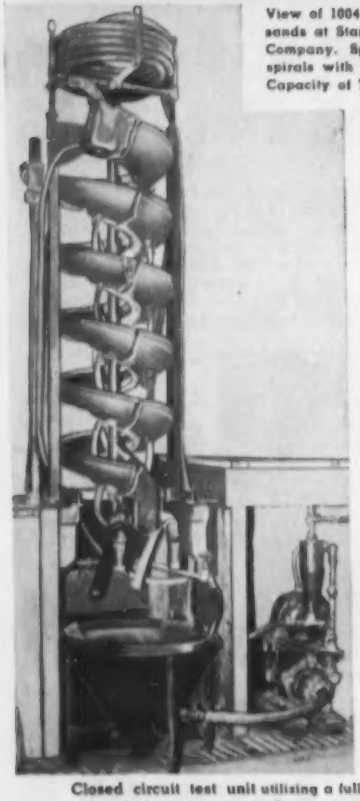
# HUMPHREYS SPIRAL CONCENTRATOR

*Low cost of installation • Low operating costs*
*No moving parts*



**Concentrating action Humphreys Spiral.—** Note wide black band of concentrate entering upper outlet, which is set for a wide cut, also narrow black band of middling entering lower outlet set for thin cut. In cleaning fine coal, refuse and middling are discharged from the concentrate ports and cleaned coal follows the path shown as tailing above.



Closed circuit test unit utilizing a full size spiral concentrator in Denver testing laboratory.

View of 1004 Humphreys Spiral Concentrators used for recovery of ilmenite, rutile and zircon from beach sands at Starke, Florida mine operated by Humphreys Gold Corporation for E. I. du Pont de Nemours & Company. Spirals are mounted on barges floating in dredge pond, one barge supporting 704 first stage spirals with pumps, another barge supporting 200 second stage and 100 third stage spirals with pumps. Capacity of 704 rougher spirals is 1100 tons per hour original feed.

- ★ *for* separation of minerals of different specific gravity in ores at sizes generally minus 10 mesh.
- ★ *for* cleaning minus ¼ inch bituminous or anthracite coal.
- ★ *for* recovery of liberated values too coarse for flotation.
- ★ *for* recovery of values too fine to be economically treated by heavy-media separation.

**HUMPHREYS SPIRALS** have been used in full-scale plant operation for concentration of chromite, rutile, ilmenite and zircon from sands; for concentration of ground ores for recovery of lead and zinc; for concentration of molybdenum flotation mill tailing for recovery of tungsten; for concentration of fine iron ore; for separation of fine phosphate rock from sand; for cleaning minus ¼ inch coal; for concentration of pyrite from flotation mill tailing; for concentration of fine gold and gold bearing minerals; and for recovering mica and barite.

The installation, operating and maintenance costs of Humphreys Spirals are so low that economical concentration of materials which could not heretofore be worked at a profit, is now possible. There are no moving parts, no vibration, weight per unit of capacity is light and requires only a light foundation. Floor space per ton treated is very small.

A testing laboratory is maintained in Denver by the Engineering Division of the Humphreys Investment Co. Results obtainable in a full size plant may be determined by tests of a representative sample of minerals or coal weighing 300-500 lbs.

FOR DESCRIPTIVE BULLETINS, WRITE

## THE HUMPHREYS INVESTMENT COMPANY
### *ENGINEERING DIVISION*

**FIRST NATIONAL BANK BLDG. DENVER 2, COLORADO**

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# POWER SHIFT
# NO CLUTCH
# TORQUE CONVERTER

## HUBER-WARCO 5D-190 (195 H.P.)

**POWER!**

Tough grading jobs are handled easily and quickly by this 31,450 pound motor grader, powered by a 195 h.p. General Motors diesel engine.

**PERFORMANCE!**

An Allison Torque Converter protects the unit from shock loads while a full power-shift transmission — WITHOUT CLUTCH — permits quick shifts under full load without interrupting power flow from engine to load. A tail shaft governor automatically adjusts engine RPM to meet any load condition, at any speed set by the operator. Power sliding moldboard is standard equipment.

**PROFIT!**

These power and performance features have been combined to increase the working capacity of the 5D-190 and reduce costly down-time. With this motor grader it is possible to move more material, with fewer passes. This increased working capacity will add more profit to every job.

For more information write for Huber-Warco 5D-190 literature — Bulletin HWG-508 and Bulletin HWG-510.

For More Details — See Your Huber-Warco Distributor

*SEE YOUR NEAREST HUBER-WARCO DISTRIBUTOR*

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**HUBER-WARCO COMPANY**

MARION, OHIO, U. S. A.

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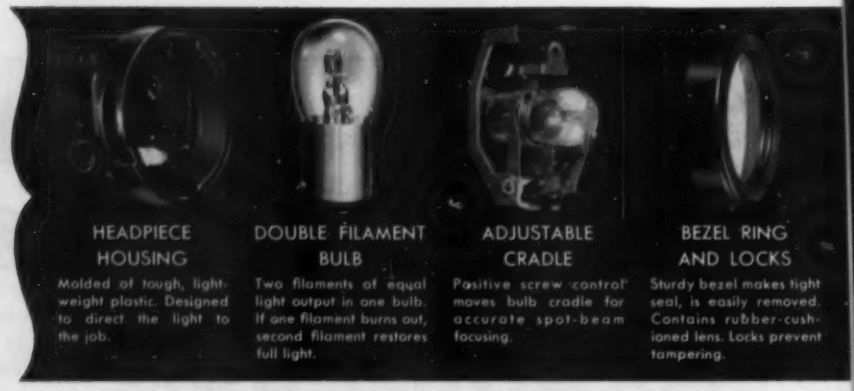

**HEADPIECE HOUSING**

Molded of tough, lightweight plastic. Designed to direct the light to the job.

**DOUBLE FILAMENT BULB**

Two filaments of equal light output in one bulb. If one filament burns out, second filament restores full light.

**ADJUSTABLE CRADLE**

Positive screw control moves bulb cradle for accurate spot-beam focusing.

**BEZEL RING AND LOCKS**

Sturdy bezel makes tight seal, is easily removed. Contains rubber-cushioned lens. Locks prevent tampering.

**EXCLUSIVE NICKEL-IRON-ALKALINE CELLS**

Battery does not destroy itself to function; does not deteriorate when not in use. Welded steel containers enclose the cells and the entire battery is encased in a high-strength, non-combustible, corrosion and impact resistant molded nylon case. The valve block is one-piece nylon construction; easily removed. All exterior metal parts are stainless steel. Rugged hood contains dependable magnetic lock device.

# THE EDISON R-4

## *. . . is worth looking into*

Convincing testimony that QUALITY COUNTS in underground illumination is provided by the world-wide acceptance of the Edison Electric Cap Lamp.

Designed from a thorough knowledge of overall mining problems, the Edison R-4, made up of compact, easily handled sub-assemblies, has the QUALITY features that keep a brilliant, unfailing beam on the job, shift-after-shift, for years.

We'll be glad to show you how this EDISON R-4 QUALITY can put new peaks on your production records, safely.

MSA
SAFETY EQUIPMENT HEADQUARTERS

*When you have a safety problem, M.S.A. is at your service. Our job is to help you.*

**MINE SAFETY APPLIANCES COMPANY**

**201 N. BRADDOCK AVENUE, PITTSBURGH 8, PA.**

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Toronto, Montreal, Calgary, Winnipeg, Vancouver, Sydney, N.S.

Representatives in Principal Cities in Mexico, Central and South America

Cable Address: "MINSAF" Pittsburgh

Clean-up takes only a few minutes per shovel because of Tournatractor's 19 mph forward and 8 mph reverse speeds. In addition to saving time, speedy tractor-on-rubber keeps loading sites and haul roads cleaner because it can get around to each shovel more times per day than a crawler-tractor.

# Kaiser Steel Corp.

## speeds mine clean-up with Tournatractor

### 1 rubber-tired rig replaces 2 crawler-tractors

Working their Eagle Mountain Iron Mine, Eagle Mountain, California, Kaiser Steel Corp. find they get more clean-up work done faster with 1 Model C Tournatractor than if they assigned 2 crawler-tractors to handle the same job. The new tractor-on-rubber replaced one full-time crawler, and does the part-time plant and pit maintenance work formerly assigned to a second track-type machine. The change to the faster, more maneuverable 208 hp Tournatractor enables the mine to keep haul units moving with less delays due to spillage or uneven pit floors.

### 3 to 4 times faster than crawlers

Tournatractor handles all clean-up assignments around 3 shovels. It shuttles back and forth at speeds up to 19 mph, which is 3 to 4 times faster than the top speed of any crawler. In addition, reverse speeds to 8 mph allow unit to back away quickly without interfering with loading operations. Big 21.00 x 25 low-pressure tires provide plenty of flotation and traction. They stand up well despite abrasive and rocky footing around pit floor.

### Also used for pulling and pushing

In addition to clean-up and bulldozing, the 208 hp tractor pulls air compressors to drilling sites and moves the frame supports which carry electric cable for shovels, drills, and other equipment.

### Get all the facts

Mine owners around the world are taking advantage of the ease of maintenance, durability, speed, and high production of the Tournatractor. If you are interested in these same benefits for your mine, get all the details from your Distributor today.

Tournatractor—Trademark Reg. U.S. Pat. Off.T-828-M-b

Tournatractor also cuts downtime for air compressors and other equipment when moving them from one location to another. Tournatractor gets on the job quicker . . . gets to the next assignment quicker. 1500 ft. is less than a minute away.

**LeTourneau-WESTINGHOUSE Company**

Peoria, Illinois

*A Subsidiary of Westinghouse Air Brake Company*

Gardner-Denver CF93 Drifters at work for Climax.

# At Climax Molybdenum . . . of course! . . . Gardner-Denver Quality

In common with many of the world's great mining enterprises, Climax Molybdenum uses Gardner-Denver equipment. The reason . . . Gardner-Denver quality that assures high efficiency and low maintenance. Gardner-Denver equipment in operation at Climax:

**Model RB94P STOPERS** **Model SFH99 DEEPHOLE DRILLS**
**Model CF93P DRIFTERS** **Model J2P JUMBOS**

Write for further information on the complete line of Gardner-Denver rock drills, deep hole percussion drilling equipment, and other mining equipment.

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

**Gardner-Denver Company, Quincy, Illinois**
**Export Division: 233 Broadway, New York 7, N. Y., U. S. A.**

# Simple rear-dump construction pays off

Construction of the Tournapull Rear-Dump has been radically simplified from that of a conventional heavy-duty hauler. In place of a foundation frame and body sub-frame, Tournapull Rear-Dump hitches rear and front wheels through a horizontal yoke extending back from the kingpin and pivoted to the body itself just above and ahead of the rear wheels. Body is simpler, much stronger . . . has no frame and sub-frame to get out of line.

Look at the photo above . . . note the absence of springs, spring hangars, and tie rods. Low-pressure tires adequately absorb the shocks of rough haul-road travel and high-speed loading. Eliminated are spring maintenance, replacement time and cost of spring parts.

Front wheel drive and kingpin-type steering help simplify Tournapull construction, too. No longer must power be carried back to the rear through a drive-shaft. Bearing and lubricating problems of a long drive-shaft are eliminated. No longer is steering handled by small front wheels subject to misalignment. There are no tie rods, no hinged steering connections to become twisted or bent.

Nor do you have the troubles of hydraulic hoists or gravity dumping with these Rear-Dumps. Dump is by an electric winch that lifts the body up on twin cables. Operation is under complete control at all times, with positive power for dump and return controlled by an electric switch on the dash. There are no oil seals, no high-pressure lines and jacks to keep tight, no freezing up in cold weather as with hydraulics. There are no shock loads as in gravity dumping. You save on regular maintenance time because there is no hoist mechanism to check . . . only a few places to lubricate.

Let us show you how these savings can put money in *your* pocket. For proof, we'll be glad to show you performance figures from a job like yours, or, if you wish, give you names and addresses of owners of Tournapull Rear-Dumps, so you can check for yourself. Call soon.

**Tournapull Rear-Dumps Come in Sizes to Fit Your Needs**

| "D" | "C" | "B" | "A" |
|---|---|---|---|
| 9 tons | 22 tons | 35 tons | 50 tons |
| 138 hp | 208 hp | 293 hp | 420 hp |

Prime-movers also power interchangeable scrapers, bottom-dumps, flat-beds, and cranes.

Tournapull—Trademark Reg. U.S. Pat. Off. 8-774-G-b

## LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

*A Subsidiary of Westinghouse Air Brake Company*

# Because the furnace room sets the pace,

## Lectromelt* Furnace Equipment

## is popular in plants all over the world

THE furnace room is the pay-off room. Production of every department that follows is limited to what the furnace produces. Dependability is a prime requirement for the furnace equipment, therefore, and there must be a minimum of down-time for repairs.

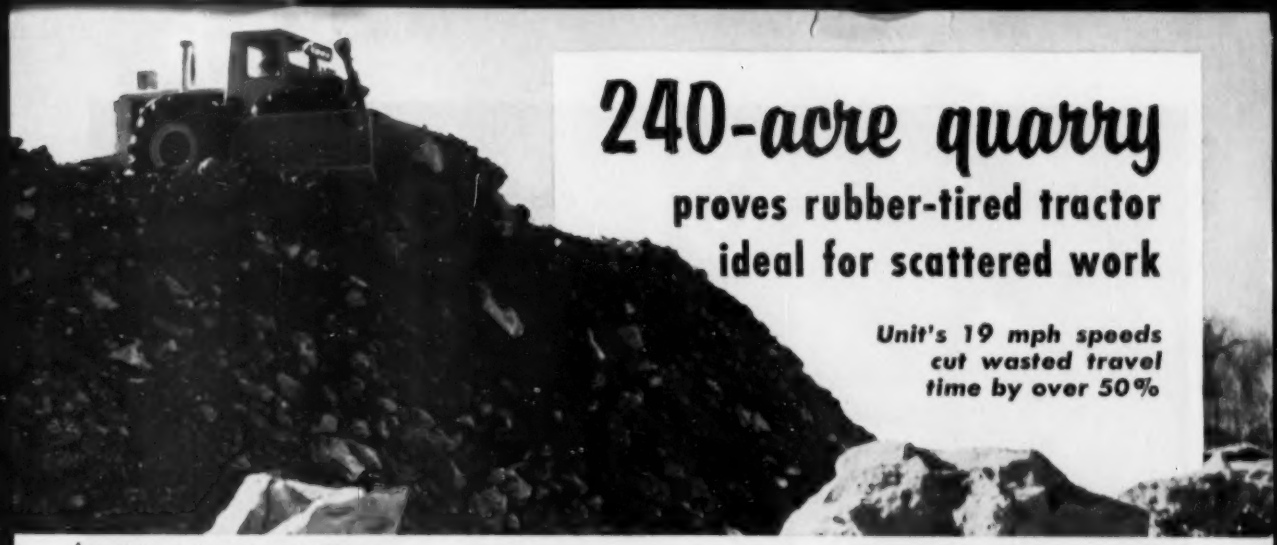
As furnaces are installed at mine mouths and other out-of-the-way places, it becomes increasingly important that they be dependable. They must also be readily adaptable to variations in processes, to keep step with process developments. Dependability and versatility demonstrated by Lectromelt Furnaces throughout the past forty years account for their use all over the world.

Catalog No. 105 describes many types of smelting and refining furnaces. For a free copy, write Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in... GERMANY: Friedrich Kocks GMBH, Dusseldorf... ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege... SPAIN: General Electrica Espanola, Bilbao... ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*



# 240-acre quarry

## proves rubber-tired tractor ideal for scattered work

***Unit's 19 mph speeds cut wasted travel time by over 50%***

▲ Multi-disc air brakes totaling 2822 sq. in. braking surface give operator confidence to work fast close to edge of dump.

▲ Instant-shift, plus 8 mph reverse, enables tractor to clean around shovel without delaying load cycles.

Stone does little damage to tires . . . tires do ▼ no damage to tracks or pavement.

Five major tractor assignments face Columbia Quarry Company at their 240-acre limestone quarry near Columbia, Illinois.

1. Clean-up around a 6-yard production shovel (which loads 1,250,000 tons of rock yearly) . . .
2. Clean-up around two 3½-yard overburden stripping shovels . . .
3. Maintaining an overburden dump . . .
4. Maintaining a waste-rock dump . . . and
5. Maintaining at least 2 of the company's 15 crushed stone stockpiles each day.

These jobs, located from ½ to 1 mile apart, are handled efficiently with only *one* tractor — a high-speed Tournatractor!

This big 208 hp rubber-tired unit drives *everywhere under its own power* — on job-to-job moves, it often reaches 19 mph. Time studies show it *averages* 13 mph. This average speed is more than twice as fast as the *top* speed of a crawler-tractor formerly used on this work. Says Superintendent E. A. Heise, "We like this movability! Tournatractor sure gets around fast from one spot to another."

### Dozes 180 loads hourly

On the job, this same speed helps Tournatractor equal or better output records of crawlers. Cleaning the edge of the overburden dump, for example, Tournatractor regularly pushes a bladeful of truck-dumped rock and clay over the edge every 20 seconds. Push forward usually takes about 12 seconds . . . change to reverse gear, ½ second . . . return, 8 seconds. Each pass moves up to 2½ bank yards.

Tournatractor also has proved ideal for clean-up around the rock shovel. Rig is maneuverable and fast enough to do the work without interfering with the shovel cycle. On clean-up after shooting, it moves in fast and reduces lost waiting time to minimum.

### 1/3 the lubricating time

Columbia Quarry also report they save time on maintenance, too. It takes Operator Vern Kremmel just 15 minutes a day to lubricate the Tournatractor, compared to 45 minutes a day to lubricate a crawler-tractor. He says, "Tournatractor is *easy* to oil and grease. You don't have to get down into the mud to do any of the work, so you don't get nearly as dirty."

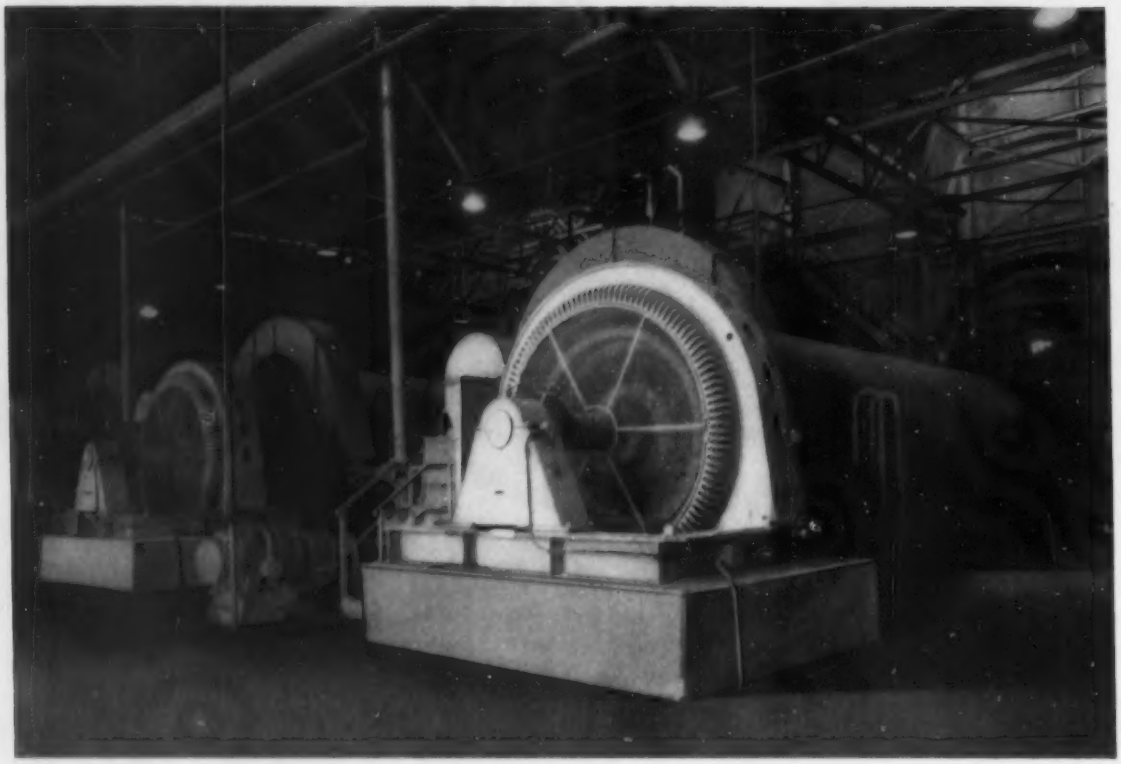
Why not investigate the high speeds, greater mobility, and lower maintenance Tournatractor can give. Call us to arrange a demonstration. No obligation.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-786-Q-b

**LeTourneau-WESTINGHOUSE Company**

Peoria, Illinois

*A Subsidiary of Westinghouse Air Brake Company*



# Pressure Lubricated Main Bearings reduce starting and maintenance costs for Traylor Grinding Mill operator

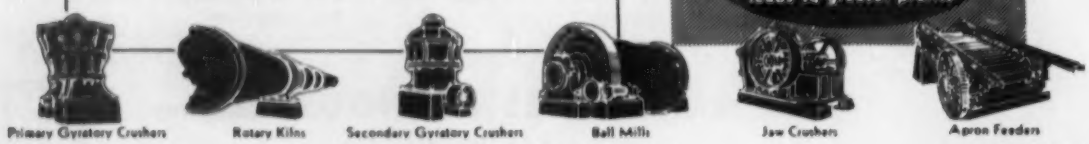
Each main bearing on a Traylor Grinding Mill is fitted with a high pressure lubricating pump. This pump coats the trunnion with a film of lubricant which lifts and floats the mill to overcome high starting torques and undue wear caused by "dry" starting.

In addition, Traylor's all steel welded shell construction and precision workmanship on all parts combine to provide smoother running mills that further reduce maintenance costs and cut down-time losses.

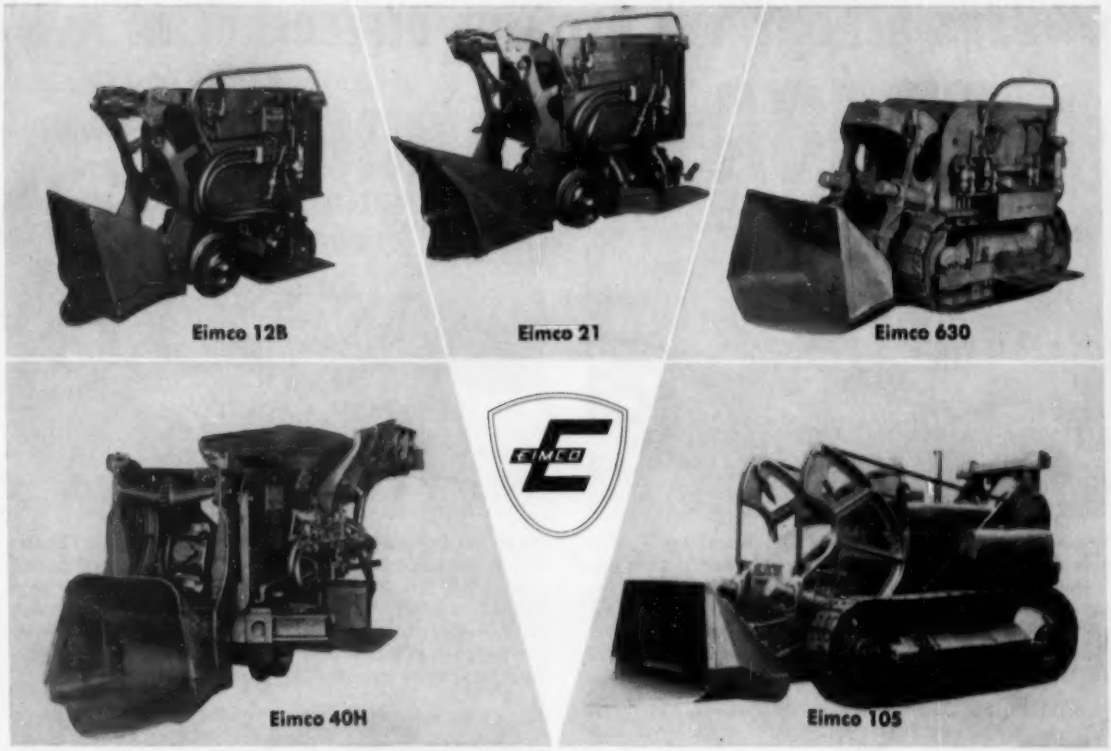
Traylor Grinding Mills . . . ball, rod and compartment types . . . are all carefully "Traylored" to individual specifications. Traylor engineers are available, without obligation, to discuss your grinding requirements and to recommend the type and size of "Traylor-Made" grinding mill you need. Drop us a line today.

**TRAYLOR ENGINEERING & MFG., CO.**
**79? MILL ST., ALLENTOWN, PA.**
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

A Traylor leads to greater profits



Primary Gyratory Crushers · Rotary Kilns · Secondary Gyratory Crushers · Ball Mills · Jaw Crushers · Apron Feeders




# THERE'S AN EIMCO TO FIT YOUR LOADING JOB

There is an Eimco loader for your loading job. Small or large tunnels, drifts, slopes, inclines, haulage ways, overburden, cleanup, road building, clearing slides or any loading job that requires speed, economy and continuous operation with minimum machine attention.

Eimco loaders are available with wheels for rail type operation and crawler mounts for trackless work. They are self propelled by air, electric and diesel motive power, depending on their type of application.

Eimcos are proved loaders — more of them are in daily use on hard rock mining jobs throughout the world than all other brands of mechanical loaders combined. Many of these have been in continuous operation for more than 20 years.

An Eimco is always your most economical loading machine. Write for details.

**THE EIMCO CORPORATION**

Salt Lake City, Utah—U.S.A. ▪ Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Pasadena, Calif. Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

EIMCO

B-184

# OWNERS REPORT THE DECISIVE DIFFERENCE IN NEW

# TD-18A Performance

**"It can self-load and deliver fastest"** "International TD-18A improvements like the new 300% stronger track frames and cartridge-type roller seals increase production, machine life, and operating ease. As for power, our new TD-18A can self-load the 8-11 cubic yard scraper and deliver fastest of any crawler we ever had." *Here's proof extra traction matches the TD-18's power increase!* G. W. Owen, McDonough, Ga.

**"Every load's a payload"** "My TD-18A International Drott is built for the operator's comfort. I know, because I'm the operator. It has 360° visibility which no other loader has. Every load is a payload." *No other outfit built gives you the TD-18's combination of power, visibility and responsive controls.* V. S. Steffes, Owner, Earthmoving and Clearing, Batavia, Illinois.

**"Operators fight for new TD-18A!"** "The TD-18A's were always good—fast, trouble-free performance and low operating cost made me money. The new model TD-18A is stronger and really planned for the man in the seat. It has operators fighting for it." Big, wide, comfortable cushions; hydraulic steering control boosters, and levers, conveniently grouped on the roomy, non-skid deck! *No wonder TD-18A handling ease turns "skinners" into high-producing operators throughout the day!* M. B. McKee, McKee Construction Co., Chickasha, Oklahoma.

**"Uranium search toughest of all!"** "I'm in the hardest work I know of—building roads into uranium claims, rim-cutting development work. The TD-18 we used for six years had the motor overhauled after five years, and when we traded a year later the transmission and drives were still original equipment. I believe this heavied-up new model TD-18A is by far the best of all." *Advances like the new bridge-strong welded track frames, stronger transmission and exclusive cartridge-type track roller seals back his judgment.* O. Frost Black, Owner, Blanding, Utah.

Ease into the foam-rubber-padded, panoramic-vision seat and see the *decisive difference*. Try new finger-tip power steering, and other big *job-easing incentives* for boosting production, as developed only by International. Prove TD-18A *full-power traction*—note, too, how the gear train is beefed-up to transmit 103 drawbar hp, and then some! Measure what new *300% stronger track frames* mean *for full-capacity performance* under slam-bang conditions. Compare how new *cartridge-type track roller seals*, and other International *downtime-prevention engineering*, beat anything else on tracks. Ask for a new TD-18A demonstration!

INTERNATIONAL HARVESTER

**INTERNATIONAL**

**INDUSTRIAL POWER**

**MAKES EVERY LOAD A PAYLOAD**

# Cyanamid REAGENT NEWS

*"ore-dressing ideas you can use"*

## *Cuts Frother Costs Substantially by Replacing Cresylic Acid with* AEROFROTH® 65 *Frother*

This copper property treating 220 tpd of an ore assaying 2.2% Cu had been using 0.5 lb. cresylic acid per ton of ore treated. Concentrates average 22%; tails average 0.2% copper. Mill tests showed that as little as 0.014 lb. of AEROFROTH 65 Frother could be used without any change in metallurgy.

The mill is now firmly established on AEROFROTH 65 Frother at the rate of 0.014 lb. per ton of ore treated. Daily frother consumption is now only 3.1 lb. of AEROFROTH 65 Frother instead of 110 lb. of cresylic acid. Other reagents used include 0.03 lb. AEROFLOAT® 238 Promoter; 0.03 lb. Sodium Ethyl Xanthate, and 8.0 lb. of lime per ton of ore treated.

This, we admit, is an unusual case. But it does indicate the substantial savings that may be made by substituting the proper AEROFROTH Frother for less efficient reagents. The Cyanamid Reagent family includes 5 AEROFROTH Frothers with a wide range of froth characteristics. These are described in Mineral Dressing Notes #20—"Cyanamid Reagents" which we will be pleased to send on request. A Cyanamid Field Engineer will be glad to work with you in selecting the frother best suited to your ore.


AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

*Cable Address — Limenitro, New York*

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G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia



Printed in U. S. A.

## Multiple Molded Rubber Block Cyclones Make Sharp Separations in 10 - 20 Micron Range . . .

Latest advance in wet cyclone design is the Type M DorrClone . . . developed for size separations in the 10 to 20 micron range. Designated as M-30 and M-50, this new design is now available with twenty 30 mm dia. rubber block cyclones or ten 50 mm cyclones in a common housing. Housings may be either cast stainless steel or bronze construction. When cover plate is bolted in place, each block is under compression to form a tight seal between feed, overflow and underflow chambers.

As with all cyclones, capacity and mesh of separation in the M DorrClone varies with the diameter of the individual units, operating pressure, feed solids concentration and specific gravity of the solids. On a slurry with a solids specific gravity of 2.7, the M-30 separates at 8-10 microns and the M-50 at 15-20 microns. As to capacity, the M-30 handles approximately 70 gpm at 20 psi, 100 gpm at 40 psi and 125 gpm at 60 psi. At these pressures the M-50 handles approximately 100 gpm, 140 gpm and 170 gpm. Top operating pressure for both is 125 psi.

For more information on this newest classification tool write for a copy of Bulletin No. 2504. Dorr-Oliver Inc., Stamford, Connecticut.



M-30 DorrClone completely assembled.

M-50 DorrClone cover plate off.

**Lab units also available . . .** for test units or very low flows. Fabricate stainless steel housing contains four 30 mm units or two 50 mm units. Separations are the same with equal diameter cyclones. Write for quotation.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
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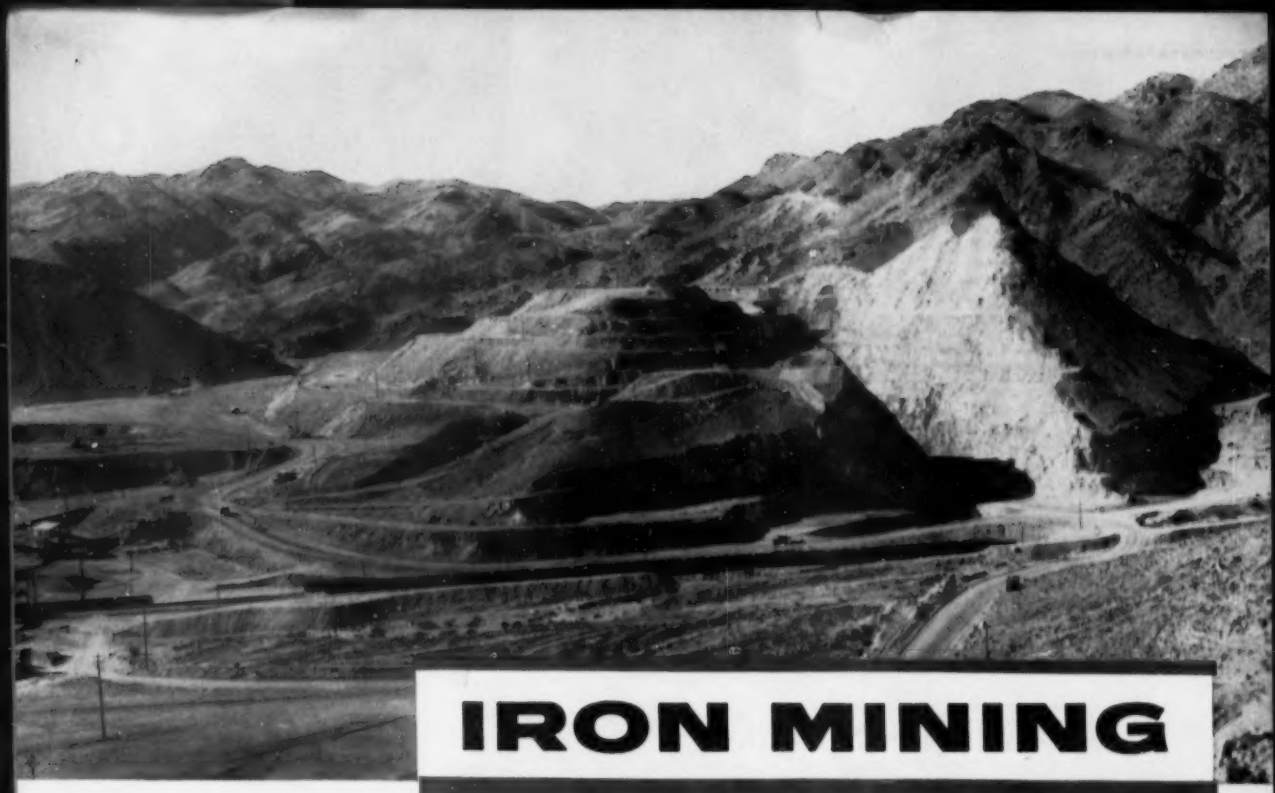
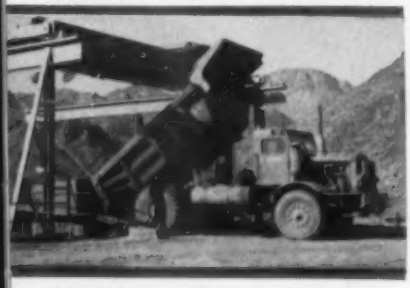


General view of Kaiser Iron Mine at Eagle Mountain, California.

# IRON MINING
## In California

## *Kaiser Steel Uses "Eucs"*

22 ton "Euc" with quarry body being loaded by 5 cu. yd. shovel.



Dumping 22 tons of ore into crusher for processing and rail shipment to Fontana Plant of Kaiser Steel Corporation.

IRON ORE for the big Kaiser Steel plant at Fontana, California, comes from an open pit mine in the Eagle Mountains between Indio and Blythe. Mining operations began in July of 1948 with 11 Rear-Dump "Eucs" of 15-ton capacity removing overburden, stockpiling low grade material and hauling top grade ore from loading shovels to the main crusher.

Performance of the original Euclid fleet was so dependable and efficient that Kaiser now uses 15 "Eucs" of 22-ton capacity with 5 of the 15-ton units. Loading shovels have 4½ and 5 cu. yd. buckets . . . hauls from bench to crusher have long grades of minus 8%. Despite big loads and steep downhill hauls, speed is controlled without excessive use of the service brakes by means of retarding units that maintain maximum safe travel speeds at all times.

If you have a problem of moving large tonnages on tough off-the-highway hauls, ask your nearby Euclid distributor for helpful facts and figures. He may be able to help you reduce costs, and besides, he's a good man to know!

**EUCLID DIVISION** GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

# Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

EUCLID

GM GENERAL MOTORS

Shown being used in a narrow mine shaft, the Worden Gravity Meter is ideally suited for gravity work in hard-to-reach locations where small size and light weight are important.

## Below ground you get best results with the WORDEN GRAVITY METER

Reduce mining exploration costs with the Worden Gravity Meter — world's smallest precision instrument for accurate gravity measurement. Manufactured exclusively by Houston Technical Laboratories, the lightweight Worden Meter (5⅛ lbs.) accurately pin-points gravity anomalies. Indicating variations in mass, these anomalies help delineate mineral beds, greatly reducing the amount of diamond drilling and crosscutting necessary for exploration.

Requiring no external power source, the sealed, self compensating Worden Meter has the portability vital for fast, economical mining surveys. Reading accuracy of the Worden Meter is 0.01 milligal.

**Worden Gravity Meters may be leased or purchased from HTL. Write for Bulletin GM-201.**

HTL

HOUSTON TECHNICAL LABORATORIES

A SUBSIDIARY OF TEXAS INSTRUMENTS INCORPORATED

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# WHAT IS A WICKWIRE ROPE DISTRIBUTOR?

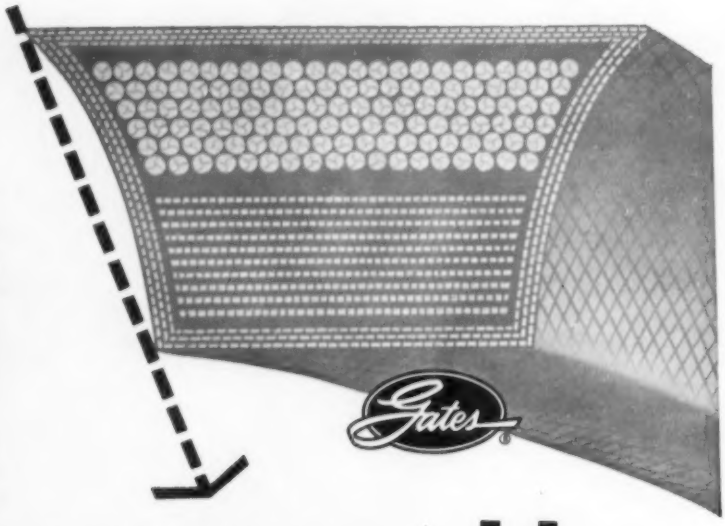
- He's quality people...handling quality products.
- He knows the local industries he serves, and he knows wire rope.
- He solves your wire rope problems. His own first-hand knowledge and experience are backed up by the technical assistance of Wickwire Sales Engineers.
- He brings you Wickwire Rope and Slings at the lowest possible cost, because he spreads his sales and distribution expense over the hundreds of related items he carries.
- He stocks exactly what you need, saving you time, paper work and storage space.
- He's a good man to know. Buy your Wickwire Rope and Slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3149

Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over $600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.




# concave sides lengthen V-belt life ...cut costs

Hundreds of plants that keep track of V-belt drive costs know this: Gates Vulco Ropes . . . the V-belts with *concave sides*...wear much longer and *cost less per year of service.*

### *Here is the interesting reason why:*

When a Gates V-belt bends around the sheave, the *precisely-engineered* concave sides (Fig. 1) fill out and become straight. Thus the sides of the belt make full, uniform contact with the pulley (Fig 1-A).

Naturally, uniform contact distributes the wear *evenly.* And *even* wear means *longer* wear.

Longer wear saves not only on replacement costs; it also saves the cost of down-time... keeps equipment producing.

### *Simple test proves value of concave sides*

Take a straight-sided V-belt (Fig. 2) and bend it. Feel the sidewalls of the belt bulge out as the belt bends. You see immediately that the bulging sides prevent uniform contact with the pulley (Fig. 2-A). Uneven contact causes faster wear...increases your drive replacement costs.

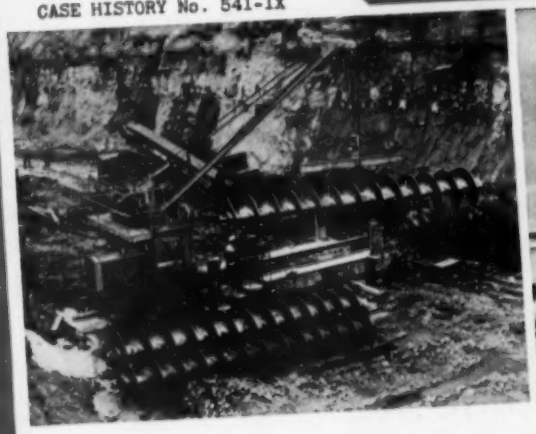
Let the cost-saving longer life of Gates Vulco Ropes contribute to *your* profits. Specify Gates Vulco Ropes—the V-belts with concave sides (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA-54B

## GATES VULCO ROPE DRIVES

GM DIESEL
CASE HISTORY No. 541-1X



**OWNER:** Peel Tree Mine, Clarksburg, W. Va.

**INSTALLATION:** GM "4-71" Diesel powers 42" McCarthy Coal Recovery Drill built by Salem Tool Company, Salem, Ohio.

**PERFORMANCE:** Mines up to 500 tons coal per day with 3-man crew. Works 9 to 11 hours per day drilling 170-foot holes 42" in diameter.

*It Pays to STANDARDIZE on*

*... available in more than 750 models of equipment built by over 150 manufacturers*

GM
GENERAL MOTORS
DIESEL POWER

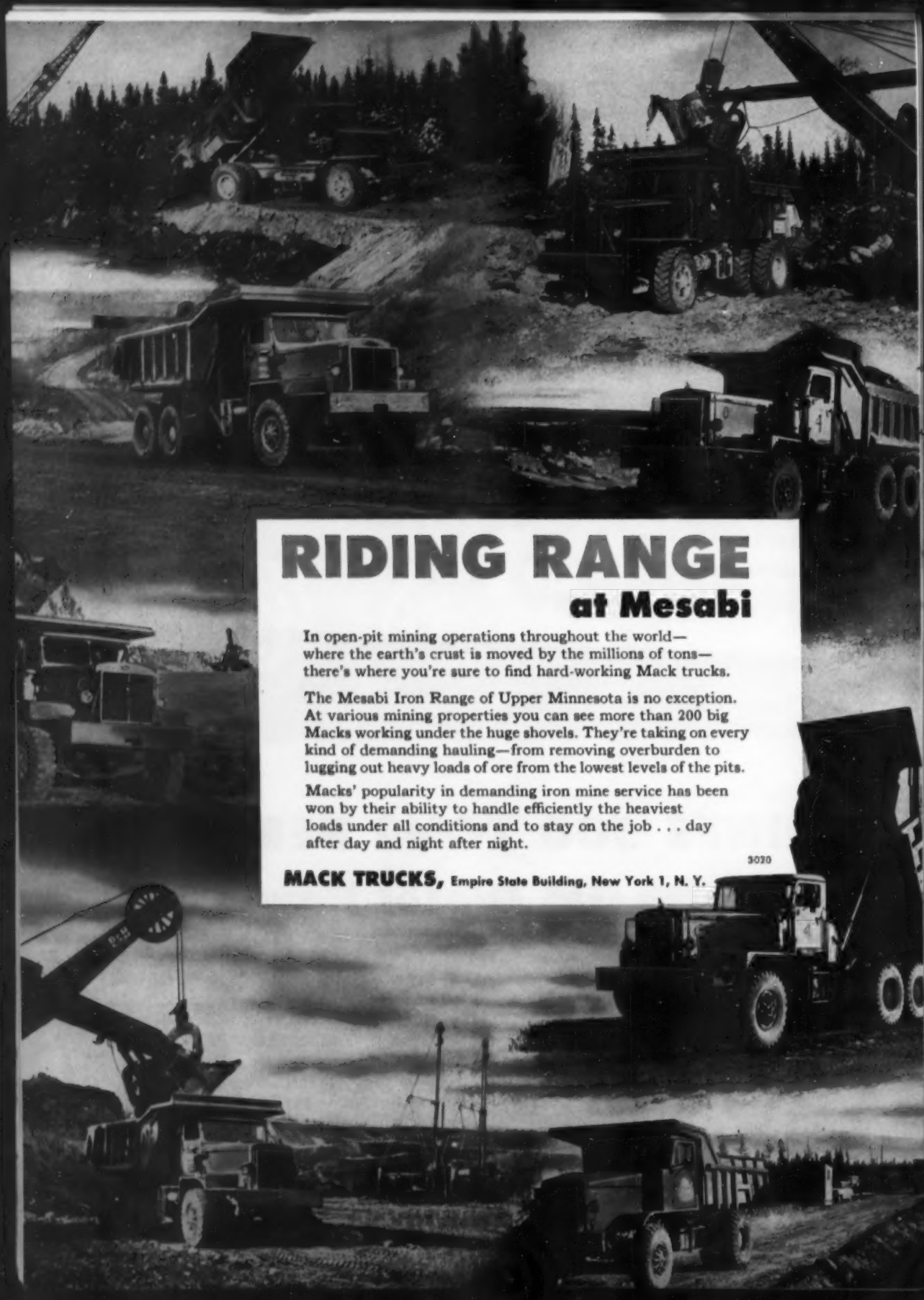
# MINES 500 TONS PER DAY
## *with GM Diesel Power*

Quick-acting General Motors 2-cycle Diesel power speeds production and cuts costs in every kind of mining operation.

With power at every piston downstroke from 2-cycle operation, a GM Diesel accelerates faster, responds to controls quicker. It fits where other Diesels won't in many kinds of mining equipment because it packs more power into a smaller, lighter engine. Clean simple design makes maintenance easy, speeds servicing. And when parts are needed, GM Diesel distributors give quick delivery at low cost.

Call in your GM Diesel distributor for full details on GM Diesel power for your mine. And before you buy a Diesel, check parts costs, too. For example, GM Diesel cylinder liners cost up to 40% *less* than liners for other Diesels of comparable power. That's one reason why GM Diesels cost less to buy and less to maintain than other Diesel engines.

**DETROIT DIESEL ENGINE DIVISION**
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines... 30 to 300 H.P. Multiple Units... Up to 893 H.P.



# RIDING RANGE
## at Mesabi

In open-pit mining operations throughout the world—where the earth's crust is moved by the millions of tons—there's where you're sure to find hard-working Mack trucks.

The Mesabi Iron Range of Upper Minnesota is no exception. At various mining properties you can see more than 200 big Macks working under the huge shovels. They're taking on every kind of demanding hauling—from removing overburden to lugging out heavy loads of ore from the lowest levels of the pits.

Macks' popularity in demanding iron mine service has been won by their ability to handle efficiently the heaviest loads under all conditions and to stay on the job . . . day after day and night after night.

3020

**MACK TRUCKS,** Empire State Building, New York 1, N. Y.

# *Now*-Du Pont Offers Two New Blasting Agents for Overburden Shooting

| DU PONT "NITRAMITE" | | DU PONT AKREMITE* |
|---|---|---|
| Manufactured and sold throughout the country in a wide variety of sizes. | **AVAILABILITY** *Large diameters only* | Can be manufactured and used by consumers under sublicense or purchased for use from sublicensed explosive manufacturers. |
| Popular combination of high strength and low cost. | **ECONOMY** | Lowest-cost blasting agent developed to date. |
| Excellent blasting action in both hard and soft materials and either vertical or horizontal holes. | **VERSATILITY** | Proven performance in bituminous-coal strip pits. Potential application in wide variety of bank shooting. |
| Good water resistance—can be loaded in water if shot within eight hours. | **WATER RESISTANCE** | Recommended for loading in substantially dry holes. Package is moisture-resistant. |
| Cannot be accidentally detonated by shock, friction, rifle bullets, "Primacord," or a blasting cap. Should be primed with a special insensitive "Nitramite" Primer, which must be initiated with "Primacord." | **SAFETY** | Cannot be accidentally detonated by shock, friction, rifle bullets, "Primacord," or a blasting cap. May be primed with dynamite in standard wrappers or flexible plastic bags, or for maximum safety, "Nitramite" Primers. |
| Furnished in a substantial container that is easy to handle and load—even in usually troublesome horizontal holes. | **CONVENIENCE** | Packaged in a flexible plastic bag that loads easily and conforms to shape of borehole. |
| Contains no Nitroglycerin and cannot produce "powder" headaches. | **NO HEADACHES** | Contains no Nitroglycerin and cannot produce "powder" headaches. |

**E. I. du Pont de Nemours & Co. (Inc.),**
**Explosives Dept., Wilmington 98, Delaware**

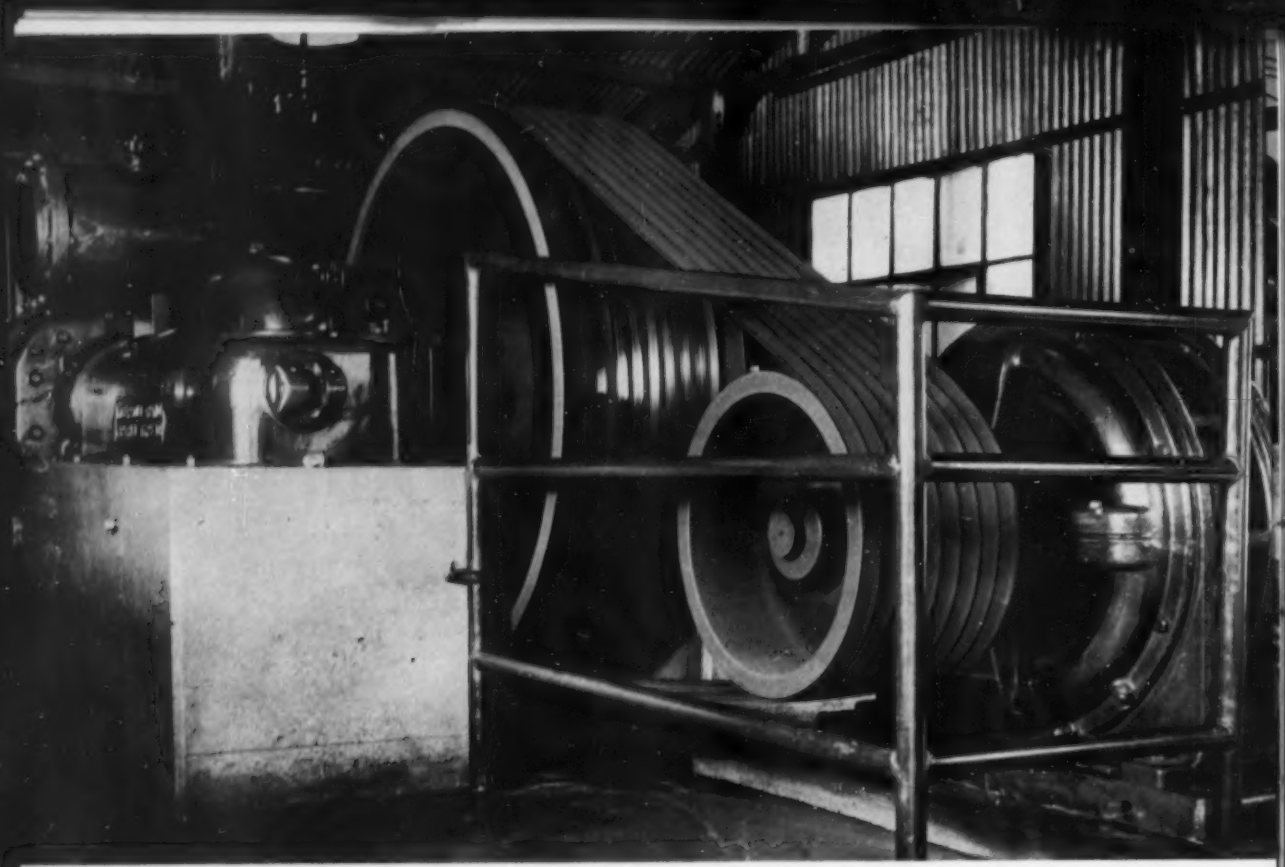
*Licensed exclusively to the Du Pont Company under the Maumee Collieries Company Process Patent No. 2,703,528.

## DU PONT BLASTING AGENTS

DU PONT

REG. U.S. PAT. OFF.

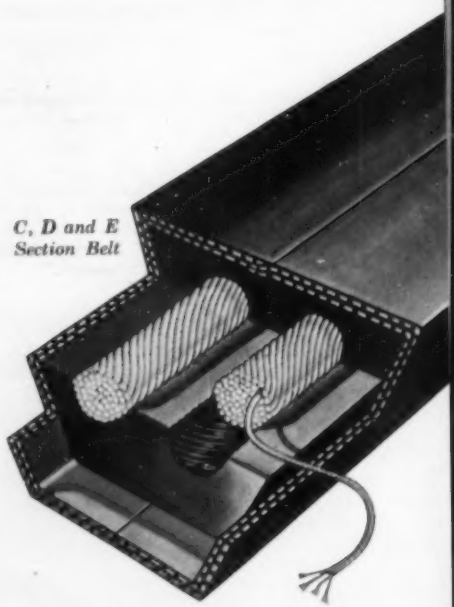
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



# Thermoid Multi-V Belts cut operating costs

There's a Thermoid V-Belt for every mining application. Every belt is *pre-stretched* to provide longer service and maximum power transmission without slippage. Thermoid C, D and E sections are rayon-grommeted for brute strength and extra flexibility that withstands repeated shock loads. The entire belt is vulcanized into a solid unit that resists moisture, abrasion, internal friction and heat.

Get longer wear with less maintenance . . . cut your operating costs with Thermoid Multi-V Belts. To meet the exacting requirements of mining service, your Thermoid Distributor carries a complete line of Thermoid Multi-V Belts, Hose and Conveyor Belting. Call him or write direct for complete information.



*C, D and E Section Belt*

**Thermoid Western Co.**

Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Nephi, Utah Trenton, N. J.

*How to avoid wire rope troubles—*

## Don't waste money on wrong size rope

**Under**loading wire rope adds nothing materially to its life. It just means you're not getting your money's worth of service from the rope. But don't go over to the other extreme and ***over*** load. Wire rope not strong enough for the job will give short, unprofitable service. Know the demands of your job and then select the rope whose rated strength provides the proper safety factor to suit your load conditions. This is how you can get maximum life from wire rope and hold down initial costs.

With so many sizes of wire rope to choose from, it takes more than an educated guess to be sure you're using the right size rope. This is a job for an expert: your Tiger Brand Wire Rope Engineer. He will make recommendations for your equipment and operating conditions. And it pays to be certain about size. For here is your greatest opportunity to increase rope life. In plain language—*to save money.*

**Most users in the West** report less trouble, longer service when they rig up with Tiger Brand Wire Rope. No wonder it outsells all other brands. Want more facts? See your local Tiger Brand Distributor or write to United States Steel, 1403 Russ Building, San Francisco 6.

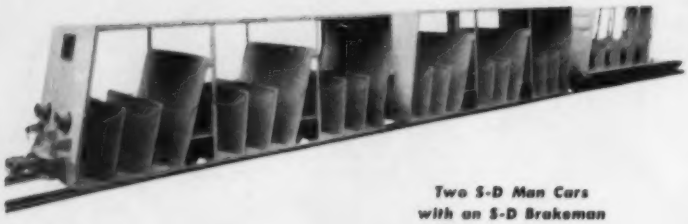
USS AMERICAN TIGER BRAND WIRE ROPE — COLUMBIA-GENEVA STEEL DIVISION — UNITED STATES STEEL

# USS TIGER BRAND Wire Rope

*United States Steel Corporation · Columbia-Geneva Steel Division*
*In the East: American Steel and Wire Division*

**UNITED STATES STEEL**

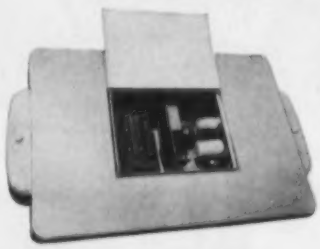
An S-D Granby



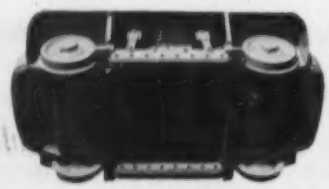
Two S-D Man Cars with an S-D Brakeman

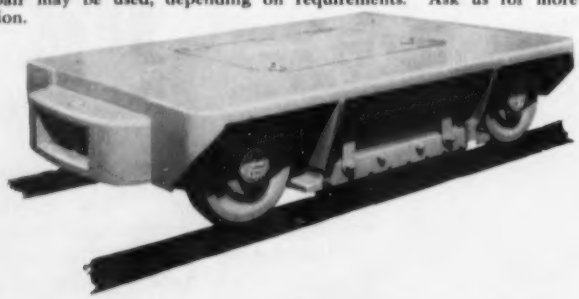
# Sanford-Day... Super

## Now you can eliminate skids and additional locomotives for braking trips downgrade!



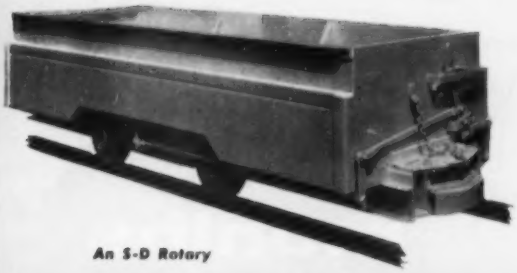
YOU NEED NO LONGER resort to skids or costly locomotives for extra braking power. We have developed a special car for braking that incorporates electrically operated magnetic brake shoes. Several are already on the job in metal mines. The S-D Brakeman Car is built to meet your particular requirements. It may be used between locomotives . . . between locomotive and cars . . . between cars or at end of a trip to prevent runaways due to coupler failures, etc. Controls can be provided at locomotive operator's fingertips. Top photo at left shows the compartment for batteries and motor-generator set. Lower photo shows the pair of brake shoes. One or several pair may be used, depending on requirements. Ask us for more information.



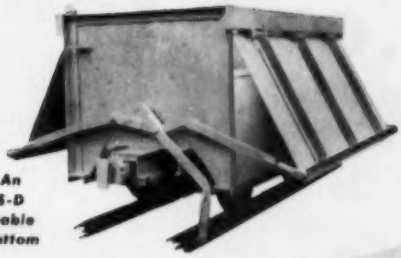


An S-D Rocker

An S-D Heavy-Duty Rocker with outside frame construction

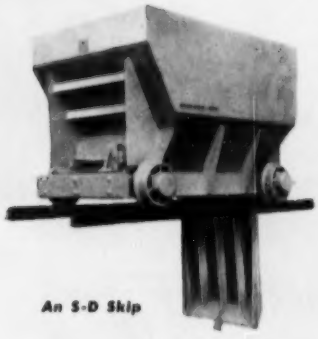


An S-D Rotary



An S-D Gable Bottom

# Market for mine cars



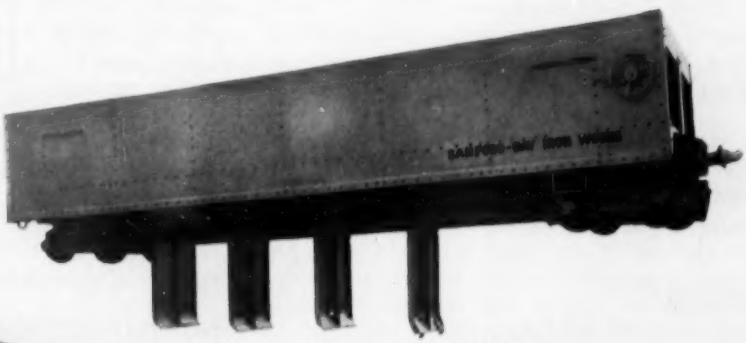
An S-D Skip

IS THERE SOMETHING SPECIAL you need in mine cars—a feature to meet your particular requirements? You probably will find the answer in our plant. Down through more than 50 years of car building experience we have solved the major problems of mine haulage.

Regardless of the type car you need, we build it . . . cars so constructed to give you more years of service with the least maintenance. Shown here are but a few of scores of all types S-D Mine Cars regularly being built for metal and non-metallic mines. All are designed and constructed to give superior service for the lowest dollar. Whether you need one car or 101, don't hesitate to get one of our engineers into your mine—face-to-face with your problem. With this type of cooperation, plus our facilities and capacity to build any type mine car of any size, any haulage problem in your mine can be solved. *SANFORD-DAY IRON WORKS, Telephone 3-4191, P. O. Box 1511, Knoxville, Tenn.*

An S-D Automatic

● ASK US ABOUT THE S-D GISMO . . . the self-loading transport that promises big new economies in mining. It merits thorough investigation by any firm excavating rock or its equivalent.



An 8-wheel S-D Automatic

An S-D Automatic with spring-mounted trucks

**Sanford-Day IRON WORKS**

KNOXVILLE • TENNESSEE

AND BROWN-FAYRO DIVISION

MINE CARS, All Types - PRECISION WHEELS - "Brownie" HOISTS CAR RETARDERS - SPOTTERS PUMPS - OIL SPRAY SYSTEMS

# 1,116,071 tons of ore in 24 months

Unloading new Northwest Model 6 for trip to pit.

This Model 6 has been in the Granby Pits for 24 months with only 3 hours "down time"

**FROM**
**July 6, 1953 to July 6, 1955:**

| | |
|---|---|
| Total shifts | 752 |
| Total tonnage ore and waste moved | 1,116,071 |
| Average tons per shift | 1484 |
| Total down time | 3 hours |

WE'VE SEEN A LOT OF RECORDS but this one is really among the topmost of them all. The illustrations show the pits of the Granby Consolidated Mining, Smelting and Power Co., Ltd., of Copper Mountain, B. C.

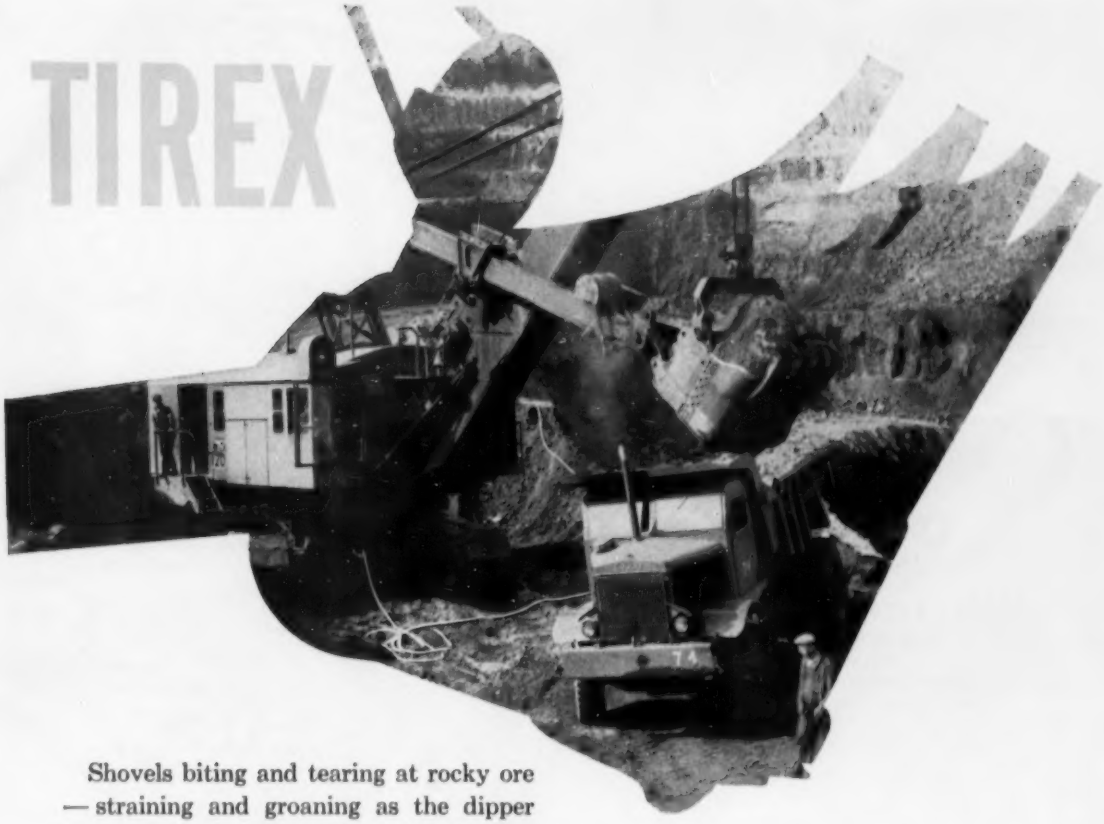
The copper ore is being handled by two Northwests, Model 6's. The older of these two rigs went into service July 6, 1953, and as of July 6, 1955, it has been in the pits for 24 months. During that time it has loaded out 1,116,071 tons of ore and waste. Not only has it accomplished this tremendous production but it has done it with only three hours of "down time". Much of the credit for this high output goes to J. B. Logan and his crew of the J. B. Logan Construction Co. of Princeton, B. C., who are contracting the loading of the material. Their personal interest in the job has played a big part in getting the best out of the equipment. One of the most remarkable things about the performance is that Mr. Logan has moved all this material with only 4 sets of shovel teeth and still has the original four sets, less one tooth. The teeth are retipped and he gets 30 days single shift with each set of reconditioned teeth.

**NORTHWEST ENGINEERING COMPANY**
1511 Field Building, 135 South La Salle Street
Chicago 3, Illinois

**NORTHWEST**
*Convertible for any Mining Material Handling or Excavation Problem*

YOU CAN'T HAVE NORTHWEST ADVANTAGES UNLESS YOU OWN A NORTHWEST

# TIREX



Shovels biting and tearing at rocky ore — straining and groaning as the dipper comes up — are dramatic proof that all is well with the shovel's trailing cable and the distribution system behind it. Feeding the insatiable appetites of these monster shovels is an undertaking of no mean proportions. It means using cables that are utterly dependable even under the most trying conditions. That is merely another way of saying that all of your shovels should be equipped with TIREX Shovel Cables.

If this shovel and its team of trucks are down even for a few hours, due to cable failure, the increased overhead will be far in excess of the cost of a new cable.

For this reason, we say that price and all other considerations, except operating dependability, are of no substantial consequence. The important point to you is the cost-per-ton of ore mined, not the cost-per-foot of shovel cable.

To keep your cost-per-ton of ore mined down to the lowest possible figure, be sure you equip your shovels with cured-in-lead, Selenium Neoprene Armored TIREX Shovel Cables. They will be on the job long after you've forgotten what they cost.

*Simplex*

**TIREX** CORDS AND CABLES *are made only by the*

**SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.**

# *Proven* PERFORMANCE

7/8" HEXAGON

## SANDVIK COROMANT drill steels

Throughout the entire world Coromant tungsten carbide tipped integral drill steels have proved their right to leadership. Consistent uniformity—lower cost per foot of hole drilled, freedom from connection troubles, longer drilling life and Copco on-the-job service—these things have made them the only logical choice wherever drilling costs are most closely watched.

Behind all this stands a program of continuous research and field tests aimed at providing the finest steels that metallurgy and engineering skill can produce.

Coromant integral steels are carried in stock at all Copco Branches ready for immediate shipment. We stand four square behind our policy that no job shall be held up for lack of Copco equipment.

FLEXIBLE

- Coromant tungsten carbide tipped steels are guaranteed.
- They will not stick in drill holes.
- Chisel-type cutting edge gives high penetration speed.
- Specifically designed for jacking pusher type drills.
- Quick and easy sharpening at working face.
- No connection problems—requires no steel shop.
- All Copco prices are published

3/4" HEXAGON

ROCK DRILLS
DRILL STEELS
COMPRESSORS
AIR TOOLS

Copco

**PACIFIC Ltd.**
930 Brittan Avenue—San Carlos, Calif.

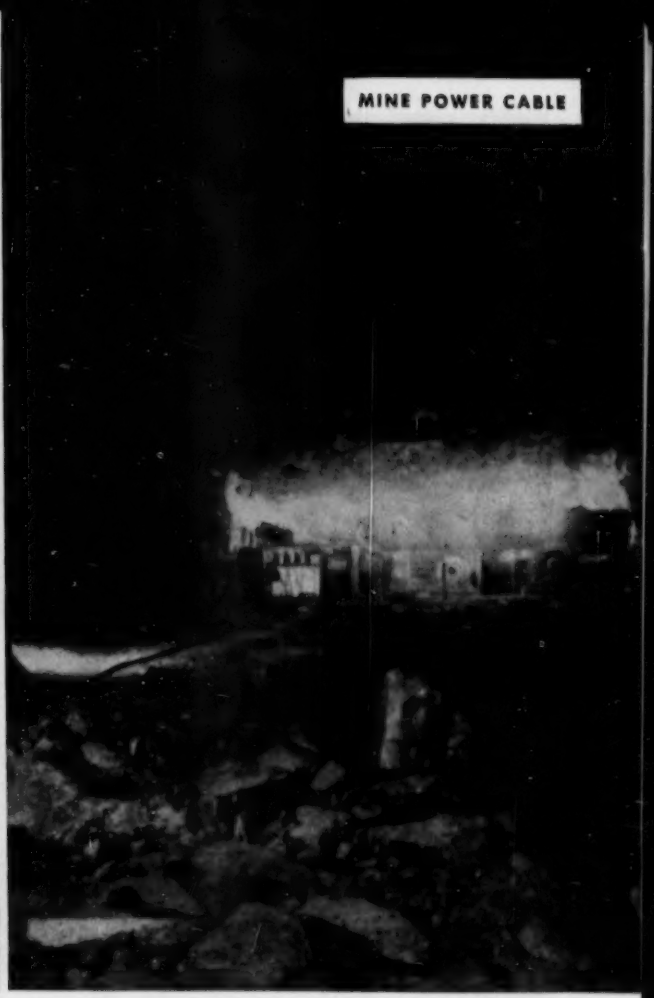
**EASTERN Ltd.**
151 Linwood Avenue—Paterson 2, N.J.

**MEXICANA S. A.**
Ave Juarez y Calle Comonfort
Torreon, Coahuila, Mexico

*Canadian Copco Ltd., Metropolitan Boulevard, Montreal A.M.F., Que.*

BRANCH OFFICES AND WAREHOUSES THROUGHOUT NORTH AMERICA

**SPECIALLY DESIGNED** for rugged conditions like this, Anaconda butyl-insulated Mine Power Cable delivers maximum service and safety.




**OPEN PIT OR UNDERGROUND,** Anaconda butyl-insulated Mine Power Cable offers exceptional mine water- and abrasion-resistance.

**FOR YOUR PROTECTION—**

# We proved this power cable in our mines

Being miners ourselves, we know mining problems. As both miner and cable manufacturer we're able to do something about them—by *designing* cable to meet problems only miners can know . . . by testing this cable in *our own mines* under actual field conditions.

**FOR MINE POWER CABLE**

Our firsthand mine experience has helped us build a sturdy cable that cuts down-time. Butyl insulation gives this cable long-aging characteristics, improved resistance to moisture, ozone and heat. Neoprene jacket—rugged, tough—has real flexibility, and resists rock-cutting, impact, flame, sun, and corrosive mine water.

Your Anaconda Distributor has full facts and can help you choose the cable best suited to meet your needs. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 55822

*Trade Mark

**ANACONDA®**
**MINE CABLE**

**FLAT-TWIN CABLE**

Improved stranding, new insulation, new grounding wire, and neoprene jacket make this a superior cable for shuttle cars, continuous miners, loaders, drill trucks, cutters.

**POWER CABLES**

Anaconda Types W & G are rugged, sturdy and long-lived. Used for mine power, shovels, continuous miners, loaders, drill trucks, cutters.

**SHOVEL AND DRILL CABLES**

Securityflex* Types W and G are used with small shovels, self-propelled drill trucks, pumps and a-c mining equipment. For higher voltages, Type SH cables (shielded) are recommended.

**SECURITYFLEX CORDS**

Unexcelled for strength, wear resistance and long life. Type SO cords (heavy-duty) provide superior service on remote control and hand drills.

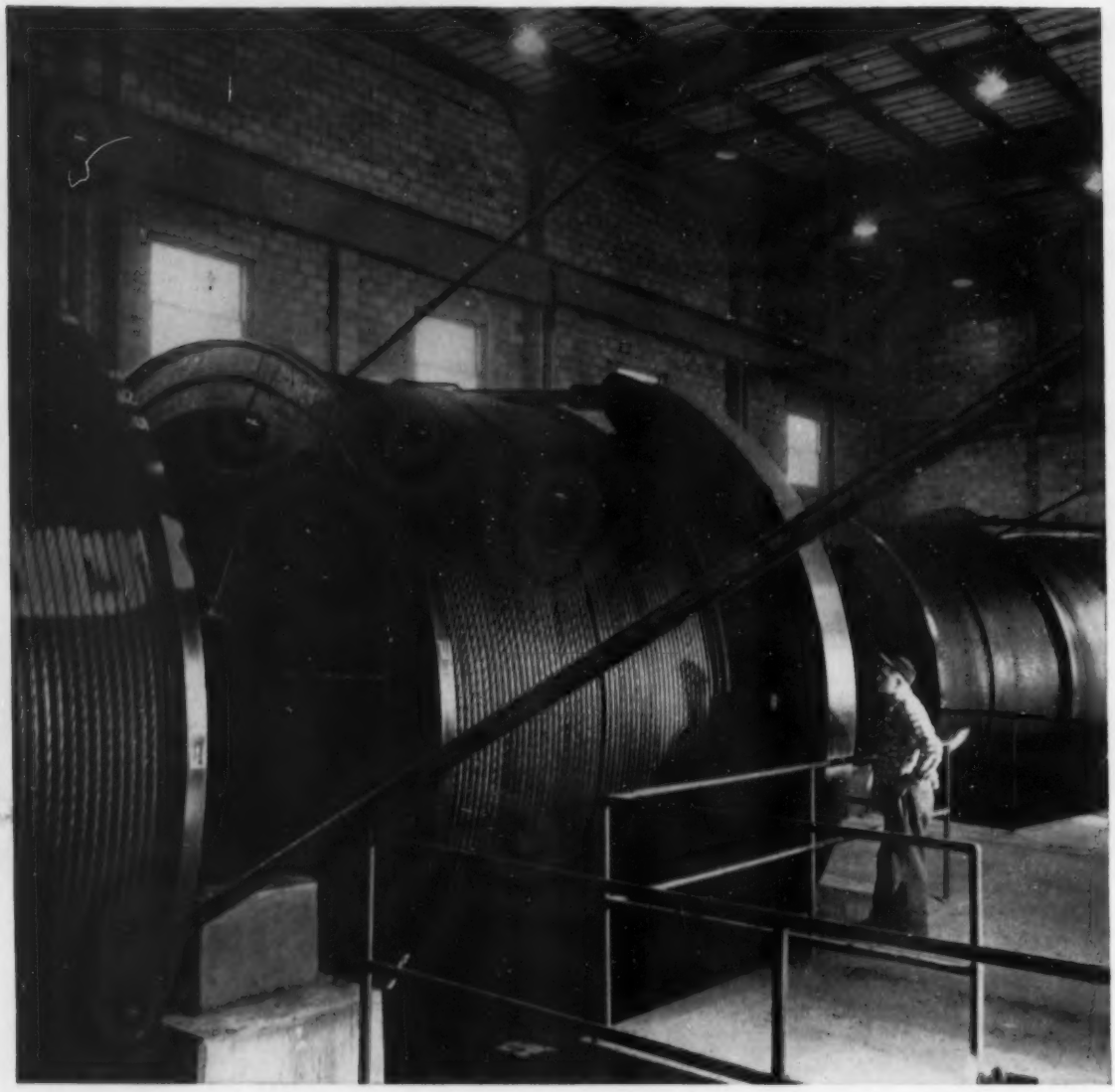
TROLLEY WIRE

FEEDER CABLE BARE OR INSULATED

TELEPHONE WIRE

SHOT-FIRE CORD

WELDING CABLE



**Wire Rope at Work**—The hoist house of this mine is a model of good housekeeping and mining efficiency. The hoisting apparatus consists of two separate installations, one of which operates the balanced ore skips, the other a man-and-materials cage.

Depth of the shaft is 2750 ft, and levels are at 1700, 2100, and 2500 ft. The skip travels at 1800 ft per min; the cage 800 ft per min with personnel, 1200 when carrying material. The handling of the heavy loads is entrusted to Bethlehem wire rope, Purple Strand grade, and almost three miles of this sturdy rope is used on the two hoists. Here Purple Strand is doing its usual reliable job, meeting every demand of the rigorous service with plenty to spare.

For full details we suggest that you get in touch with your nearest Bethlehem Wire Rope Distributor. Or check with our sales offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, Spokane.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

***Bethlehem Wire Rope is stocked by leading distributors throughout the West***

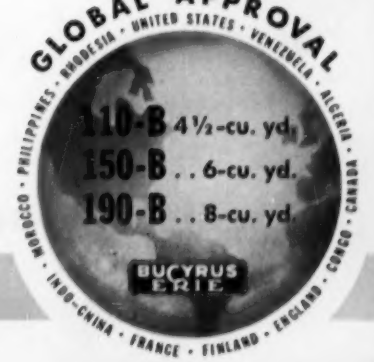
**BETHLEHEM PACIFIC**

# It's Bucyrus-Erie For the Tough Metal Mining Jobs

When the rich iron ore deposits of Cerro Bolivar mountain in Venezuela were discovered, Bucyrus-Erie 190-B shovels were selected to spearhead the job of excavation. Swinging 8-cu. yd. dippers, they keep a fleet of 20-cu. yd. carriers on the move.

The proved superiority of Bucyrus-Erie large-capacity excavators is the result of new front-end design, extra-strong construction, and advanced engineering throughout. Combined with the speed and smoothness of Ward Leonard electric control, these features offer performance that means higher output at the lowest cost per yard.

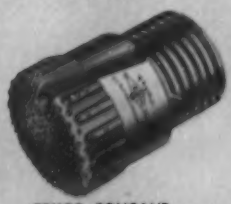
36155C


GLOBAL APPROVAL
MOROCCO · PHILIPPINES · RHODESIA · UNITED STATES · VENEZUELA · ALGERIA
110-B 4½-cu. yd.
150-B . . 6-cu. yd.
190-B . . 8-cu. yd.
BUCYRUS ERIE
INDO-CHINA · FRANCE · FINLAND · ENGLAND · CONGO · CANADA

**Bucyrus-Erie Company**

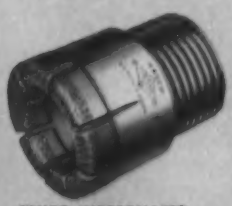
South Milwaukee, Wisconsin

TRUCO CORING BIT



TRUCO CONCAVE BLAST HOLE BIT

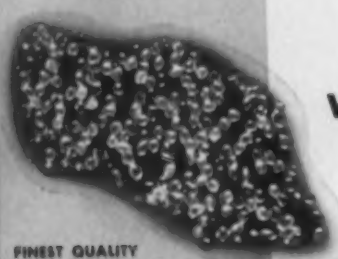
TRUCO PILOT BIT



TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT



FINEST QUALITY DRILL BORTZ

# The Charm of Booie, The Witch Doctor

Booie, the Kaffir witch doctor, didn't want to part with the charm. Often he had made big magic with it in his ceremonial dances and without it he might lose face. And, didn't it have miraculous powers?

Schalk van Niekirk, the old Boer trader, thought so—at least it had the power to make him a very wealthy man, for this pebble was four times the size of the one he had sold two years before.

So, all day long they haggled and Schalk brewed pot after pot of Dutch coffee, heavy with sugar, well flavored with a magical potion from a stone bottle and served it with the free hand of a man who feels a fortune tickling his fingertips.

Finally, he stood up, stamped out the fire and said, "Booie, come to my kraal and I will give you 500 sheep, 10 oxen, and a horse—I have nothing more." Booie held out his hand; suddenly, he was incredibly rich.

Schalk sold the big diamond—it weighed 83½ carats—for $56,000, a handsome fortune in 1870. In London, after cutting to 46½ carats, it proved to be of the finest color and brilliance, and the Countess of Dudley gladly paid $125,000 for it. In her tiara it became "The famous Dudley Diamond."

Diamonds are precious in drilling, too, because they provide the vital, time-saving, cost-reducing element in Truco Diamond Bits. They assure that irresistible cutting power which takes Trucos through any formation, swiftly, accurately, thriftily, dependably. Have you consulted your Truco Diamond Bit Catalog lately?

## TRUCO DIAMOND BITS

*by*

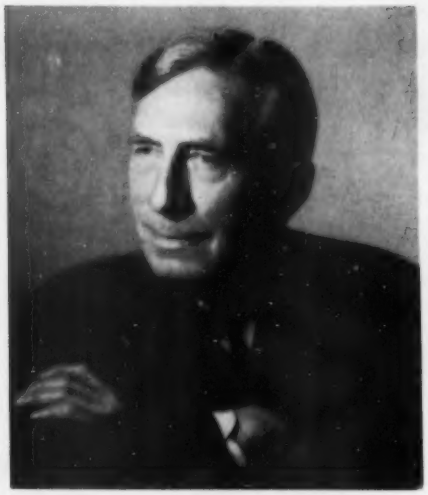
## WHEEL TRUEING TOOL COMPANY

**3200 W. Davison Avenue, Detroit 38, Michigan**

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

# Drifts and Crosscuts

## Miller Freeman's Work Ends



Miller Freeman, founder and publisher of MINING WORLD and the companion Overseas Edition, WORLD MINING, passed away suddenly on September 18 at the age of 80. A heart attack took him as he planned a new campaign in conservation—in the expanded use of natural resources through the opening to private development of Federal Lands now lying idle.

Miller Freeman himself could not be idle, even at 80. His life-long concern with the cause of conservation he carried to his last hour. Long a friend and intimate of Herbert Hoover, he was to confer with him on this matter in New York in October. Subsequent to his visit with the former President, he was scheduled to visit with Administration officials in the Interior Department and Attorney General's office pursuant to his crusade for a return of Federal Lands to the people following the land grabs of the Ickes regime during the New Deal era.

During the late 30's and 40's, Miller Freeman spoke often from the pages of MINING WORLD in behalf of sound programs of conservation and resource development on Federal preserves, and vigorously attacked the National Recreational Area program of Secretary Ickes. Later exchanges with Franklin D. Roosevelt on this subject appeared in the pages of MINING WORLD during the fall of 1940, during which Roosevelt denied that his Interior Secretary had "ambitions to close important areas to prospecting and mining."

Importantly, as a result of this effort, New Deal plans for additional preserves in the Cascade area of Washington and other areas failed.

Toward the end of World War II, Mr. Freeman vigorously campaigned for additional highway development that would connect coastal areas with Alaska and in turn open important new mineral areas in the northwestern part of the continent.

President of Miller Freeman Publications, and himself a pioneer in the field of industrial publishing, Mr. Freeman succeeded to a tradition of frontier journalism.

His father was a Confederate soldier who after the Civil War worked to the West, publishing a newspaper, The Frontier Index, successively in 20 towns as the railhead of the Union Pacific advanced across the continent. Born in Utah, Miller Freeman moved with "the press on wheels" until the wagons reached Yakima, Wash.

From there, age 21, he moved to Seattle and, pioneering on his own, entered the field of industrial publishing.

From this beginning grew the Miller Freeman Publications, one of the nation's leading industrial publishing houses, with editorial offices in San Francisco, Seattle, Los Angeles, Portland, Chicago, New York and Vancouver, B.C.

Natural resources and their conservation commanded his constant interest and he was known internationally for his contributions to progress in this field, particularly in fisheries. To this objective, and to the development of transportation facilities, waterways and highways, he gave years of work and thought, and the gentle leadership-by-suggestion of which he was a master.

He served the nation as a naval captain in World War I, and in a hundred selfless assignments. He loved the West and held a boundless faith in its future.

As a publisher, he counted the freedom of the press a trust and privilege, to be cherished and protected; not a vested right to be exploited.

Of his journals, as of himself, he required independence above all else. They should serve, but never be subjective nor subjected. They should be smart, but never smarty. They should be honest, fair, and intelligent. They should have faith, and be worthy of faith.

Miller Freeman passes, but the forces he generated continue to grow.

Continued on page 43

# 70 NORDBERG GRINDING MILLS and 37 SYMONS® CONE CRUSHERS for processing TACONITE in the Lake Superior Iron Ore Region...

SYMONS® CONE CRUSHERS and NORDBERG GRINDING MILLS have long proved their efficiency, dependability and economy in the profitable reduction of ores and minerals the world over. In the case of *TACONITE*, one of the hardest and toughest of all ores to process, the mining fraternity again depends on Symons Cone Crushers and Nordberg Grinding Mills for the economical production of large tonnages of fine crushed and milled product . . . as evidenced by the fact that, following extensive tests and research in pilot plants, 37 Symons Cones and 70 Nordberg Rod and Ball Mills were recently ordered for delivery to the mammoth reduction works now under construction in Northern Minnesota.

The thirty-seven Symons Cone Crushers . . . all Super Heavy 7-foot types, have been given the difficult assignment of secondary and tertiary crushing of the hard, tough Taconite Iron Ores. The seventy Nordberg Rod and Ball Mills were selected to meet the exacting requirements for primary and secondary grinding. Included are 33 rod mills—twenty-nine 10′ x 14′ units and four 10′ x 16′ units . . . as well as a total of thirty-seven 10′ x 14′ ball mills.

Thus, in Taconite operations . . . *as in all of the great ore and industrial mineral operations the world over . . .* NORDBERG MACHINERY is the outstanding preference among leading producers for processing great quantities of finely crushed and ground product at low cost.

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**NORDBERG MFG. CO., Milwaukee, Wis.**

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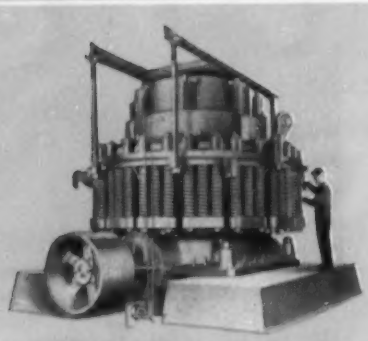
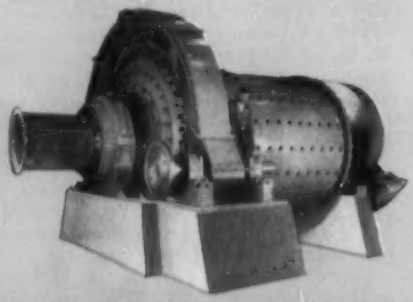


**SYMONS CONE CRUSHERS** . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head and Intermediate types, with crushing heads from 22″ to 7′ in diameter, in capacities from 6 to 900 tons per hour. Shown is a 7′ Super Heavy Unit as used for Taconite service.



**NORDBERG GRINDING MILLS** are built in ball, rod, tube, pebble and compartment types for practically all wet and dry grinding operations. Shown is one of the 10′ x 14′ Ball Mills for Taconite service.

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# Capitol Concentrates

## Issuance of Certificates for Rapid Tax Write-Offs Frozen by ODM Order

The Office of Defense Mobilization recently issued an order freezing the granting of accelerated tax amortization certificates. The order has some decidedly peculiar aspects. Three categories are named:

1. Closed Goals—the issuance of certificates of necessity shall be discontinued immediately. All current applications shall be denied immediately.
2. Suspended Goals—Applications in this category shall be held in suspension until a decision is made either to open or close the goals involved.
3. Open Goals—The issuance of certificates of necessity shall continue.

An analysis of the lists shows many apparent inconsistencies. Incidentally, the majority of the closed or suspended goals are in minerals or metals and are under the jurisdiction of the Interior Department.

Chrysotile asbestos, barite, beryl, chromite, columbite-tantalite, acid-grade fluorspar, lead, metallurgical-grade manganese ore, molybdenum, tungsten and zinc are in list one, definitely closed.

On the suspended list are antimony, bauxite, chemical-grade chromite, cobalt, iron ore, taconite, battery and chemical-grade manganese ore, rutile and titanium metal. (Also, by the way, freight cars, which are reported to be in very short supply.) Now, why cobalt should be suspended is difficult to understand as it is in many cases a substitute for nickel which is in short supply and appears on the "open" list.

Electric power also is on the suspended list. For what it may be worth, it should be noted that ODM granted some $300 million worth of tax amortization certificates to an assorted list of power companies the day before the "freeze" order issued.

Titanium metal also is on the suspended list, in the face of a recent Senate report pointing to a possible shortage of titanium in the near future.

Among metals on the "open" list is mercury which, judging from the rapid fall in price during the last few months, can hardly be in short supply.

### • Mica Regulation Change Brings Confusion

The GSA got itself into somewhat of a mess recently by changing its mica regulation in such a way that the government would accept block mica and do the splitting.

Reports indicate that the wages of the splitters were doubled immediately and the price changes involved were such that as much as $2,000 per ton could be realized by producers who formerly got $640 per ton for the same product. It was an honest mistake in judgment, and one which, naturally, made the producers very happy.

However, when GSA received reports on how costs were increasing under the new regulation and found out that the program could not be completed under the original allocation of funds and it would have to apply to the Office of Defense Mobilization for an undetermined number of millions of dollars to complete it, the agency decided that it must return to the original regulations, purchase specifications and price. Much consternation among the mica producers ensued and an angry group of miners descended upon Washington, insisting that the revised program be continued until a new schedule more beneficial than the original program could be worked out. At this writing the outcome still is in doubt.

### • New Tungsten Research Project Launched

Although the Office of Defense Mobilization would be happy to shut down the domestic tungsten industry (evidently not needed for our mobilization base, in ODM's estimation), the Bureau of Mines on August 12, 1955, announced a new research program on Colorado ferberite tungsten ores.

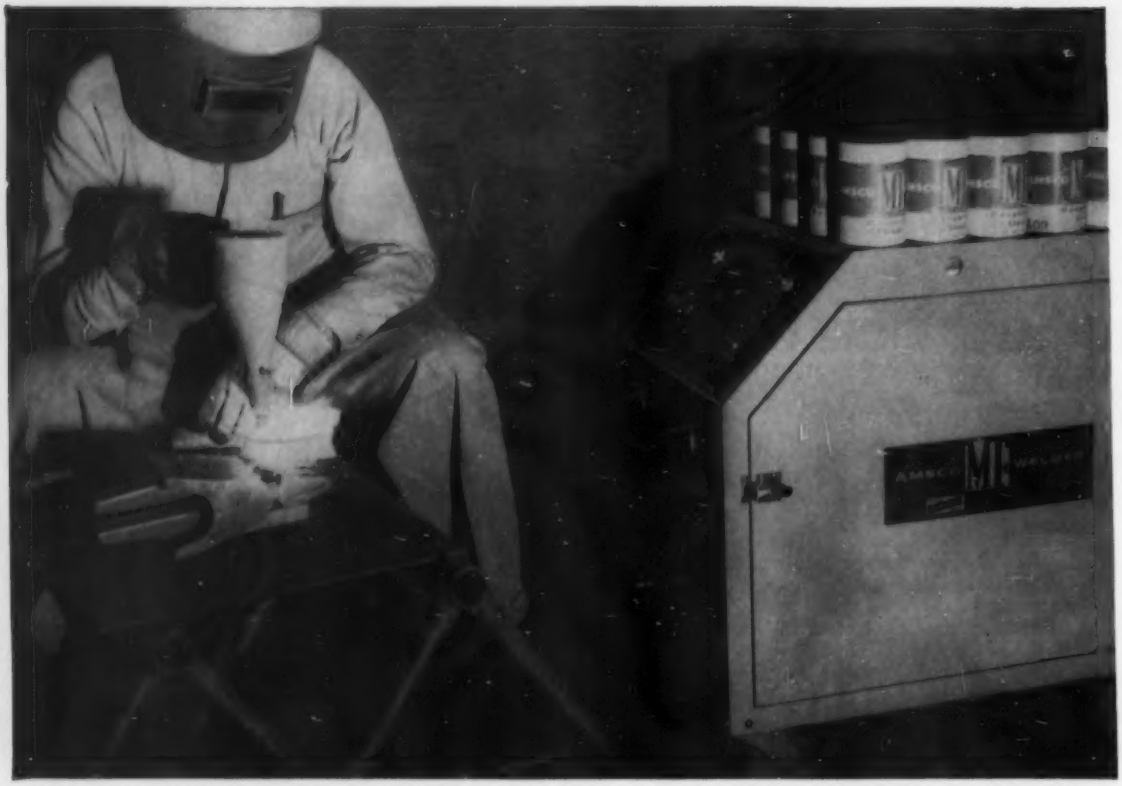
In support of the project Acting Secretary of the Interior Davis stated it as the opinion of the President's Minerals Policy Committee that domestic consumption will reach 16.5 million pounds by 1975. (This is a magic date taken from the Paley report.) Davis also mentioned in passing that in 1951 the U. S. produced less than 6 million pounds and the rest of the world 19.8 million pounds—not mentioning the domestic consumption in that year. (The year 1951 is *not* a magic date, but apparently the last year for which the bureau's statistical section could furnish figures.) Davis also points out the necessity for tungsten in armor piercing shells, tool steel, jet engines, tungsten carbide, shields for radioactive materials, and electrical contacts. We are all for more and better tungsten research (also manganese, etc.) and furthermore we trust Director Flemming of ODM was furnished a copy of the release by Acting Secretary Davis.

### • Completion of Stockpile Program Nears

The Office of Defense Mobilization estimates that most of the government's secret goals for the 75 materials stored in the nation's stockpile will be filled within the next two years.

According to ODM Director Flemming, the prospect of early completion of the greater part of the stockpile program has resulted in a slow-down in new contracts to expand the nation's domestic supplies of strategic and critical materials.

ODM noted, however, that copper, aluminum and nickel continue in short supply. As a result, the agency reported, anticipated stockpile deliveries were deferred during the latter part of the second quarter and have been deferred during the third quarter of the calendar year 1955.



Welder is shown welding a "wear-sharp" repointer to the shank of a dipper tooth using the Amsco MF and flux.

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Continued from page 39

## What ABC Means To You

The familiar ABC symbol, shown just to the left and displayed on page 3 of every issue of MINING WORLD, carries a particular significance to you, the reader, because it is the mark of quality in the business paper publishing field. In order to display the symbol, MINING WORLD must maintain the highest standards of integrity in reporting circulation figures, and, indirectly, must constantly improve the editorial content. As our reader, you are a powerful factor in determining whether MINING WORLD can continue to display this stamp of approval, since we must serve our subscribers to their satisfaction.

ABC stands for Audit Bureau of Circulations, a unique, non-profit association of advertisers, advertising agencies, and publications. Membership in the association is denoted by the ABC symbol. The primary objective of the work of the association is to supply advertisers with accurate, verified information about the net paid circulation of all publisher members; this places our readers in the position of judge and jury in determining MINING WORLD's true worth.

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The ABC symbol is the advertiser's highest standard of circulation value. Every manufacturer wants his message placed before the largest number of interested parties possible. Audited circulation is the advertiser's best yardstick of true merchandising appeal. Thus MINING WORLD is pledged to keep true and accurate circulation records, and we must constantly strive to better our articles and features to measure up to levels that both advertisers and readers alike desire.

## The Las Vegas Version

With the kick-off time nearing for the annual American Mining Congress convention in Las Vegas, now is the time to pause, get a firm grip on your bankroll, and reflect on this mode of life of ours.

Everyone even remotely connected with mining knows all about frontier camps, gambling, and back-country living. But the convention held in the world's number one playground will expose us all to a considerable change of pace. Insead of brass spittoons, swimming pools will reign. Gone will be the Calamity Janes, and the Clementines in exchange for personalities like Lili St. Cyr or Lena Horne. Miners and other assorted individuals attending the convention will be introduced to the Las Vegas brand of plush atmosphere complete with rich carpets, high caliber entertainment, and just plain fun. For a run down on what you'll find at convention city turn to page 64.


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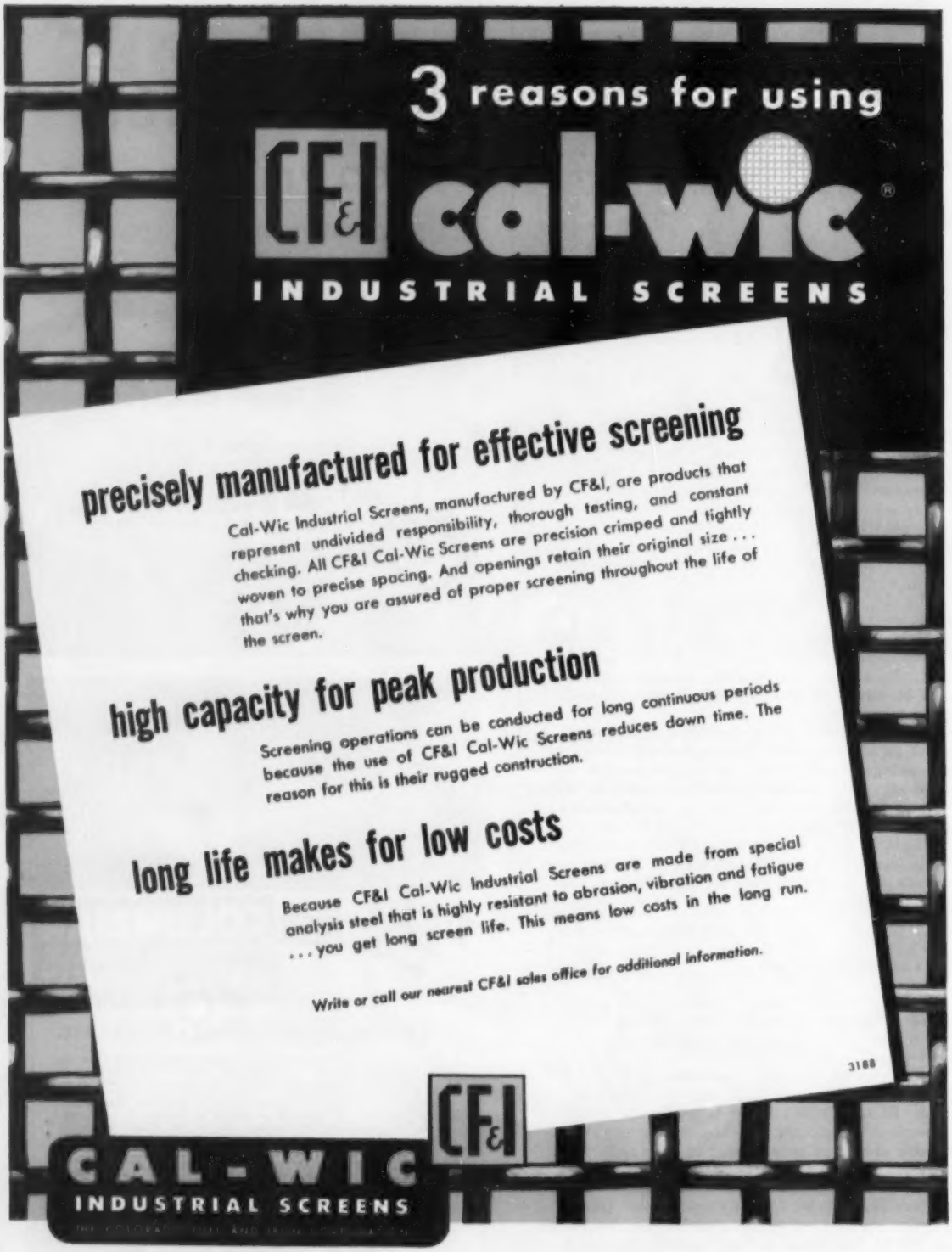
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# Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

October 1955


## INTERNATIONAL PANORAMA

CANBERRA, AUSTRALIA—Airborne prospecting for uranium is to be done over the Antarctic continent by Australia's research expedition planned for that continent.

RANGOON, BURMA—The Government of the Union of Burma is taking steps to increase the mineral production of the Union in order to increase foreign exchange earned from sales of minerals.

LA PAZ, BOLIVIA—The Bolivian government has granted a 25-year gold concession covering 15,000 hectares in the Alto Beni region to the Southern Heater Corporation of Compton, California.

HAMBURG, GERMANY—The Soviet Union has resumed shipment of chrome ore to Western Germany. Shipments arriving by sea at this port originate at Riga, Latvia.

MEXICO, D. F., MEXICO—Aztec Minerals Company plans to mine 1,000 tons of high-grade magnetite ore daily at its new mine southwest of Pochutla, Oaxaca.

POTRERILLOS, CHILE—The Anaconda Company has proven a major copper orebody at the Indio Muerto mine 20 miles northeast of here. Reserves are several hundreds of millions of tons of plus-1.0-percent copper ore. It will be mined by block caving.

MT. ISA, AUSTRALIA—The Rio Tinto Company has offered to spend $13,380,000 in development of the Mary Kathleen uranium deposits here which are controlled by Australasian Oil Exploration Company.

TREADWELL, TENNESSEE—New Jersey Zinc Company has started development of a 2,000-ton-per-day zinc mine and construction of a flotation plant here.

SPOKANE, WASHINGTON—Washington's second major uranium producer—Daybreak Uranium, Inc.—has shipped an initial 500-ton lot. The original producer, Midnite mine, is now being developed by Newmont Mining Corporation's Dawn Mining Company. Both are north of Spokane.

ELKO, NEVADA—The United States Smelting, Refining and Mining Company has paid $100,000 for 55 percent interest in the rich Diamond Jim lead-silver mine. Sellers were a prospector and two merchants who had grub-staked him.

KITWE, NORTHERN RHODESIA—De Beers Consolidated Mines Limited has started diamond exploration in the Kanona area. The firm has an exclusive prospecting right from the government.

WASHINGTON, D. C.—The Office of Defense Mobilization has suspended the government's program to increase titanium production. With only 32 percent of production being used and output to jump from 5,000 tons in 1954 to 22,500 tons in 1957 no new plants are needed.

HANOVER, NEW MEXICO—The New Jersey Zinc Company has reopened its underground Hanover zinc mine here after a two year shutdown.

BRISBANE, AUSTRALIA—The National Lead Company has formed a new subsidiary—Mineral Deposits Pty. Ltd. to expand production of rutile, ilmenite, and zircon. Through Titanium Alloy Manufacturing Co., Pty. Ltd., National Lead has long been an important Australian producer of these minerals.

DALLES, OREGON—The Harvey Machine Company has received federal government approval for construction of a 270,000 annual ton aluminum plant here. The government is to have first right for purchase of the aluminum.

SAN FRANCISCO, CALIFORNIA—The office of Defense Mobilization has released 11,000 tons of stockpile destined copper to private industry during the year's fourth quarter. ODM has also diverted 75,000 tons of contracted aluminum to industry during the same period.

## Expand Monticello Mill: Revise Buying Schedule

Work will be completed this month on the United States Atomic Energy Commission's $2,000,000 project for expanding and modernizing its uranium ore processing facilities at the Monticello, Utah mill. The project includes erection of a complete new mill and extensive alterations to the old plant which has been used for uranium ore reduction for several years. When work is completed, two types of leaching circuits for treating uranium ores will be available—acid and carbonate. One unit of the new mill eventually will reprocess tailings from vanadium ore processing operations which were carried on during World War II and which are believed to contain significant quantities of uranium.

The AEC recently announced a change in the ore-buying schedule at the plant, providing for a revision in deductions to be applied to ores containing more than 6 percent lime. Two separate schedules for ores not meeting the specifications of Domestic Uranium Program Circular 5, Revised, such as high lime-content ores, have been established. Payment will be made under whichever of the following schedules will give the greatest return to the shipper: 1) ". . . a deduction will be made of $1.00 per dry ton plus 30 cents per dry ton for each one percent of $CaCO_3$ in excess of six percent fractions in proportion," or 2) ". . . no payment will be made for vanadium, and a deduction of $3.70 per ton will be made."

## Kennecott Makes Payment For Washington Property

Bear Creek Mining Company, subsidiary of Kennecott Copper Corporation, has made a $15,000 first payment on a $450,000 option to purchase the property of Glacier Peak Mining and Smelting Company in Snohomish County, Washington.

Bear Creek has been negotiating for the claims since 1953, and has done extensive drilling. This year two helicopters transported men and supplies into the area. They made a record number of 17 trips in one day, carrying 5,200 pounds of freight. The helicopters even took in heavy planks to build a 16- by 16-foot landing field.

The mile-high claims on the west slope of the Cascade Mountains were located in 1900 but little tunneling was done and no ore was shipped. Main values are in copper, molybdenum, and silver.

Present officers of Glacier Peak are Mrs. Joseph Sample of Cle Elum, president; Mrs. Harrison Benjamin of Cle Elum, secretary treasurer; Harry Meek of Roslyn, Jack Haight of Cle Elum, and Clinton Wright of Yakima, trustees. All are relatives of the original owners.

CAPACITY of Wah Chang Mining Corporation's Lincoln Division mill is 750 tons of tungsten ore daily. Rock flows from the primary crusher, located in the building at right, to secondary and tertiary crushers, and then to mill at lower left.

# Low Mining Costs Spark Growth At Wah Chang's Nevada Operation

**By STANLEY H. DAYTON**
Associate Editor
Mining World

Five years ago Tempiute was just another desert wilderness in south central Nevada a long way from the nearest highway. Today it is a scene of bustling activity, the center of operations for Wah Chang Mining Corporation's Lincoln Division (current output 825 tons of tungsten ore per day). The little publicized expansion of production at the Lincoln mine was built on a solid foundation of cost cutting mine practices (now down to $5.20, 1955 average per ton) reinforced with metallurgical know-how in treating the complex fine-grained scheelite ore.

Some 200 miles away Wah Chang's Black Rock mine near Bishop, California is busily turning out another 500 tons of ore daily, most of which is concentrated in a 400-ton flotation mill. The excess is shipped to a custom mill near Bishop. The combined output of the Lincoln and Black Rock mills places Wah Chang squarely in the picture as one of the biggest producers of tungsten ore in the United States.

### *First An Open Pit*

The Tempiute deposit was first operated as an open pit; the flotation mill started in August 1952. Operational difficulties were soon encountered, and C. M. Dice, vice president of the parent Wah Chang Corporation, completely revamped the then present thinking and was instrumental in switching from open pit mining of two parallel ore bodies to underground mining. At the same time the mill was converted from flotation to a combined gravity-flotation process to improve recovery and metallurgical efficiency. Since this fundamental change in policy, the Lincoln operation has staged a spectacular comeback under the guidance of J. J. Strutzel, Jr., vice president and general manager of Wah Chang Mining Corporation. Costs have been cut to the bone, but company engineers are still looking for ways to shave a few pennies here and there.

Wah Chang has established a modern townsite at this outpost which is 35 miles from the nearest highway and 84 miles removed from the nearest railhead at Caliente, Nevada.

In 1951 Wah Chang Corporation, founded by K. C. Li, organized its subsidiary, Wah Chang Mining Corporation. The exact purpose was to explore and develop tungsten properties in the western United States. Now the subsidiary is interested in acquiring other mineral deposits and is main-

taining an active exploration department.

### Geology

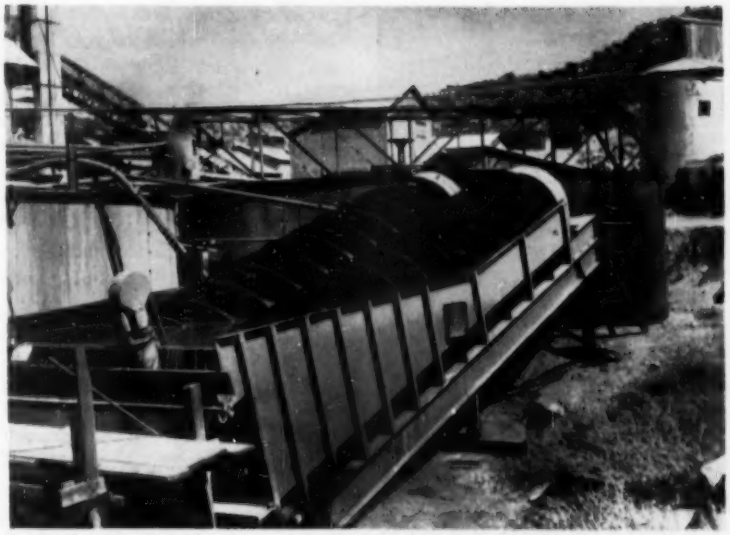
The principal formation of the Lincoln Mine area is a massive Paleozoic limestone that has been invaded and altered by two younger granite stocks.

Two, nearly parallel, scheelite-bearing tactite zones occur near the contact on the northwest and west side of the south stock. The strike is north to northeast and the dip is 55° to 75° west. The two zones are separated by a narrow band of marbleized and coarsely crystalline limestone overlaid by 50 to 60 feet of highly silicated platey limestone. The tactite around the north stock is narrow and discontinuous and contains too little scheelite to be economically significant.

The Moody or footwall ore zone lies conformably against the granite and persists to considerable depth. Scheelite occurs in three distinct zones; the sulfide or footwall zone, the garnet or center zone, and the garnitite or hanging wall zone. Scheelite in the sulfide zone is spotty and averages 0.30 percent $WO_3$ over an average width of 20 feet. Scheelite in the garnet zone is relatively consistent and averages 0.50 percent $WO_3$ over an average width of 10 feet. The best scheelite occures in the garnitite lenses scattered along the hanging wall. Scheelite, fluorite, calcite, chlorite, quartz, and epidote are the principal minerals that have replaced the coarse crystalline limestone. The lenses range from 50 to 120 feet vertically and horizontally, and from 5 to 30 feet in thickness; the average grade is 0.80 percent $WO_3$.

The Grubstake or hanging wall ore zone occurs in strength north of the main shaft and from a little below the 100 level to the surface over a length of about 750 feet. Near the main shaft the Grubstake is separated from the Moody by the platey silicated limestone which pinches out at about 300 feet to the north. At this point the Grubstake splits into two veins separated by 15 to 20 feet of banded limestone. The footwall split is separated from the Moody by 30 to 50 feet of gossan. The footwall segment of the Grubstake is believed to be due to a post mineral thrust faulting and subsequent folding. Diamond drilling from the Moody 300 level has indicated only one Grubstake zone with scheelite values below ore grade. Most of the production from the Grubstake has come from the 100 level north of the main shaft where 0.50 to 0.80 percent scheelite occurs in shoots in both segments of the zone. Most of the sulfides of the Grubstake occur next to the gossan, but the scheelite values are below ore grade.

Strong Grubstake outcroppings occur near the south end of the Lincoln



PRIMARY FUNCTION of this Western Machinery Company, 60-inch, duplex classifier is to make a sand-slime separation of bulk sulphide flotation tailing. Sands report to the coarse gravity section and the overflow to a flotation circuit.

K. C. LI
Chairman

J. J. STRUTZEL
Vice Pres. & Gen. Manager

CARL M. DICE
Vice President

GEORGE F. REED
Assistant General Manager

ED WOODS
Gen. Supt., Lincoln Division

LARRY DAVIS
Mill Supt., Lincoln Division

STANDING at portal of new Carl Dice Adit are Al Nielson, mine superintendent, J. J. Strutzel, and George Reed (left to right).

Mine property. These outcrops will eventually be prospected from the Moody 300 level which at the present time is being driven in that direction.

### Unpretentious Mine Plant

One of the most impressive features is the modest and unassuming appearance of the mine plant. At first glance you wonder how the mine can keep the mill going at 700-plus tons, day in and day out. It is evident that good planning and a well coordinated system has been installed to maintain the very good production record and low costs attained.

The mine is opened on three levels —the 100, the 300, the 500, the 600 and by a 65° inclined shaft which bottoms just far enough below the 600 to provide room for a pocket. The new sixth level just recently completed will serve as a main haulage tunnel. The portal of the 600 level is at the mill crusher elevation. This new level will eliminate winter haulage problems from the upper ore bins at the portal of the 100 and 300 levels and at the shaft collar, since trucks won't have to fight steep snow and ice covered roads to get to them. Presently most of the production comes from the 300 level, which accounts for about 60 percent of the output.

### Drawpoint Loading

The mining system employed is drawpoint loading from shrinkage stopes by Eimco 12B Rockershovels. In some cases where the vein is narrow, scram drift sublevels (10 to 15 feet above the haulage drift) are used to collect ore from the stopes. Scrapers in the scrams then load the cars in the haulage drift.

The stoping blocks are 100 feet long and arranged along the length of the ore body. A manway and service raise is driven at the end of each block. Drawpoints are spaced on 20-foot centers; they are established by blasting one 5- by 6-foot crosscut round in the wall of the haulage level, then raising a 5- by 6-foot round 6 feet high in the back of the drift. After initial stope rounds are blasted and all draw points connected at the sill, the raises are belled. The haulage level is confined to the hanging wall side of the vein wherever possible.

### High Output Per Man

Ninety percent of all the drilling done at the mine, both in the stopes and in main level development work, is done with Ingersoll-Rand Jacklegs. Usually, four men contract a stope. They do all the drilling and blasting, loading, tramming, and installation of pipe and ventilation tubing in their working place. A breakdown of the work distribution would go something like this. One man drives and timbers the manways. Two men do the stope work. The fourth man operates the mucking machine at the draw points and trams the ore to the shaft pocket or to the surface ore bins. (Production from the 100 and 300 levels is hauled to surface bins through adits, and that from the 500 level is hoisted to the 100 level.)

**Average Mine Costs at Wah Chang Mining Corporation's Lincoln Division, Tempiute, Nevada During First Six Months of 1955**

| *Item* | *Cost Per Ton* |
|---|---|
| Drilling and blasting | $1.05 |
| Mucking | .42 |
| Tramming | .26 |
| Timbering | .33 |
| Pipe, track, and lighting | .15 |
| Air power | .13 |
| Equipment repairs | .51 |
| Explosives | .24 |
| Fuel and lubricants | .02 |
| Ore haulage to mill stockpile | .38 |
| Hoisting | .09 |
| Miscellaneous | .40 |
| Allocated expenses[1] | 1.12 |
| Bishop, California office expense | .03 |
| Total | $5.13 |
| DEVELOPMENT COSTS FOR FIRST SIX MONTHS OF 1955 | |
| Drifting and raising | $1.26 |
| Diamond Drilling | .07 |
| Allocated expense | .45 |
| Total | $1.78 |

Average milling cost for 1954 was about $4.50 per ton.

[1] Overhead, including supervision

MACK TRUCK dumps mine-run tungsten ore into a 50-ton receiving bin at the mill. The bin feeds the primary jaw crusher.

There are a total of 120 men on the mine payroll. Production per man shift has averaged 6.8 tons, but during one 30-day period a high of 7.8 tons per man shift was reached.

### Bonus System Important

These figures are even more impressive when one considers that only nine stopes are in production at the Lincoln mine. This means that each stope must produce slightly over 90 tons daily. Ask the mine supervisory personnel how they maintain this exceptional record with such low costs, and they'll say that a number of factors are directly or indirectly responsible. High on their list is the incentive pay system which has been installed.

The changeover from the use of stopers to Jacklegs has been of fundamental help. With the Jacklegs now being used in stopes all drilled holes can be kept in ore, thereby reducing the amount of overbreak. This is an extremely valuable feature in a pinching and rolling vein.

Drawpoint loading with mucking machines has been a very important factor in maintaining output. This type of stope can be developed much faster than the chute loading type. In addition, chute hang-ups are reduced,

# Flowsheet of Wah Chang Mining Corporation's

## Lincoln Division Mill

## Daily Capacity is 750-tons

### Crushing Section

1. 50 ton receiving bin
2. American Manganese Steel Company pan feeder
3. Traylor jaw crusher
4. 300 ton bin
5. Traylor cone crusher
6. Symons shorthead crusher
7. 400 ton fine ore bin
8. Two 5 by 10-foot Traylor rod mills

### Grinding and Sulfide Section

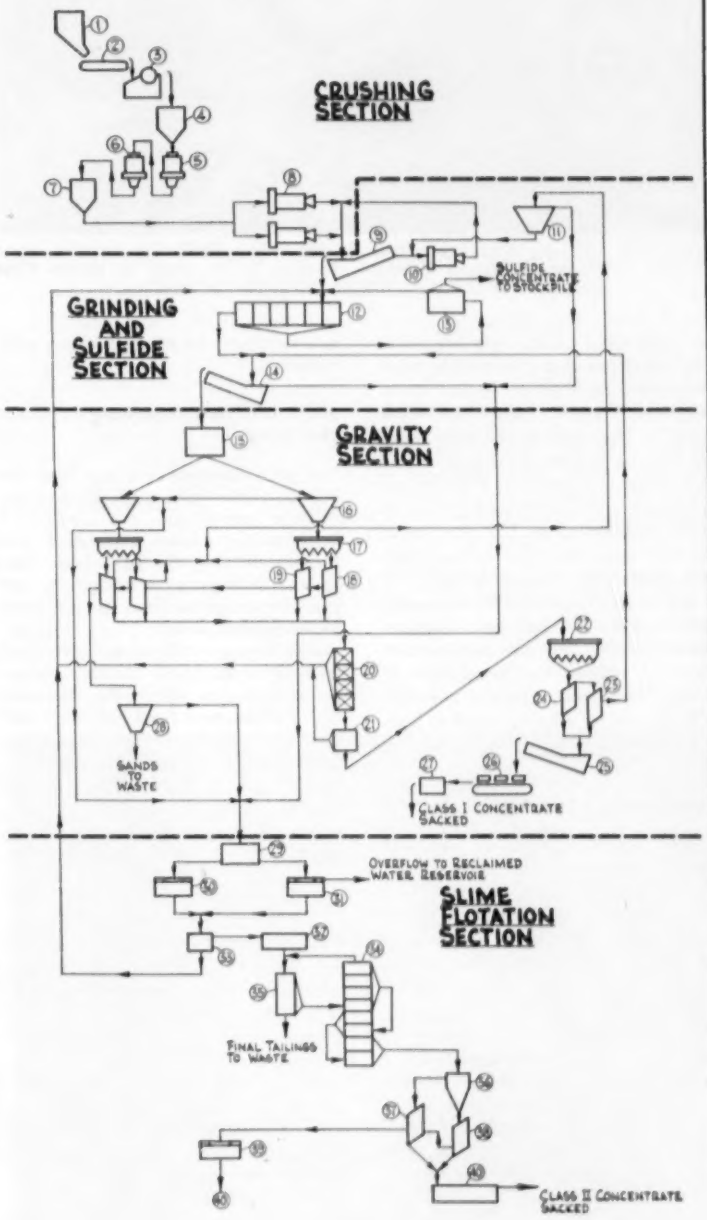
9. 8-foot Dorr duplex classifier
10. 7 by 5-foot Allis Chalmers ball mill
11. De-watering cone for table middling
12. Six, 62-inch Wemco Fagergren flotation cells. Sulfide roughers
13. Two, 62-inch Wemco Fagergren flotation cells. Sulphide cleaners
14. Wemco, duplex, spiral classifier

### Gravity Section

15. Denver distributor
16. Two de-sliming cones
17. Two Wemco, 10 spigot, hydraulic classifiers
18. Five Deister Concentrator Company coarse sand tables.
19. Five Deister Concentrator Company fine sand tables
20. Four, 15-inch Agitair flotation cells. Sulfide scavengers
21. Denver Unit Cell. Sulfide scavenger
22. Wemco, 4 spigot, hydraulic classifier
23. Two Deister Concentrator Company tables
24. Three Deister Concentrator Company tables
25. De-watering classifier
26. Infra-red ray drier
27. Magnetic separator
28. De-watering cone

### Slime Flotation Section

29. Distributor
30. 45-foot diameter Dorr thickener
31. 45-foot diameter Dorr thickener
32. Conditioner
33. Four, 66-inch, Wemco, Fagergren cells. Slime sulfide roughers
34. Eight, Denver flotation cells. Scheelite cleaner cells
35. Eight, 54-inch, Wemco, Fagergren cells. Scheelite roughers
36. Dorr-Oliver 10-inch centriclone
37. Deister Concentrator Company table
38. Deister Concentrator Company table
39. 20-foot diameter thickener
40. Pan drier
41. Thickener underflow to acid treatment section. Tailing from the acid circuit reports to waste. Class III concentrate made in this section and a 90 percent $CaF_2$ by-product is stockpiled.



ROUGHER TABLES in gravity section are fed with hydraulically classified spigot products of Western Machinery Company classifier. Tables, made by Deister Concentrator Company, can thus be set for optimum recovery.

as is the need for blasting hang-ups. The usual practice is to double track around the draw points so that no interference results from the work going on elsewhere on the main level. All blasting is done from central control panels underground. Milli-second delays are used, which have produced better fragmentation. The practice at the mine is to use semi-gelatin primers with Atlas RXL 175 powder which is a low velocity, nonfume, nonsmoke powder. Since the powder is very insensitive, the semi-gel primers are used to reduce the possibility of missed holes. Also, Hercules new EP-160-3X powder is being tested in both stopes and drifts with excellent results.

### New Haulage Level

The recently completed low-level haulage tunnel driven at the mill crusher level is 3,200 feet long and was started in December 1954 and completed in May 1955. This is a 7- by 8-foot tunnel which was driven using a Joy jumbo mounted with Ingersoll-Rand DA 35 drifters using 1⅛-inch round steel and Copco four-wing bits. Normally, the cycle was set up to make five rounds per three-shift day. The drilling pattern used was a five hole box burn and a total of 28 to 32 holes per round. Average footage was 5.0 feet per round. In this tunnel, as in other mine workings, the nonfume powder was used. The level is tracked with 18-inch gauge, 30-pound rails. Little timbering was necessary, except in a few watercourses where it was necessary to catch the back with cribbing.

### Shaft Will Be Temporary Ore Pass

A pilot diamond drill hole from the bottom of the shaft was drilled to the haulage tunnel, and the connection between the tunnel and shaft was raised following the drill hole. The shaft will serve as a temporary ore pass to transfer ore from the 500 level to the haulage level.

The new lower level will afford an excellent opening to further explore the ore bodies at depth. Diamond drill stations have been cut every 200 feet. Car passing during driving was facilitated by a modified Canton car transfer which was built at Black's Machine Shop, Bishop, California.

### Milling

Milling the ores mined at the Lincoln Division was a particularly difficult and complex problem. In the first place some of the scheelite was very fine grained, leading to complications in a strictly gravity type of separation.

The ore deposit yielded a high content of mixed sulphides which compounded the concentration problem since sulphur in the concentrate must be limited to 0.5 per cent to meet government purchase specifications. Normally, the feed to the mill contained sulphides which vary from 10 to 20 per cent from day to day. The sulphides occur mainly as pyrite and pyrrhotite, with some sphalerite and molybdenite. These mixed sulphides required some method of treatment other than roasting and magnetic separation to drop them from the products produced by the mill.

Still another obstacle was the occurrence of fluorite ($CaF_2$) in the ore. This troublesome mineral was found in quantities sufficient to contaminate the concentrates. The depression of fluorite during scheelite flotation is very difficult because normally collectors are used which react with the calcium radical of the tungsten mineral. Therefore, fluorite tends to float under nearly identical conditions, along with scheelite.

### Research Necessary

Years of constant study, test and research were devoted to the metallurgy and the flowsheet to unravel the above problems. Bob Wigglesworth was instrumental in developing the (scheelite fluorite separation) process now used at the mill. A metallurgically efficient operation based on the findings of the test work and research of Wah Chang Mining Corporation has been devised and put into practice. Mill heads average nearly 0.5 per cent $WO_3$, and tailings are consistently low.

The three problems mentioned above—fine-grained scheelite, mixed sulphides, and the fluorite content of the ore—were resolved in a mill flowsheet that actually breaks down into three sections following initial crushing and grinding.

First is a bulk flotation step to recover the majority of the sulphides from the mill feed. This is done in six, 62-inch, Wemco-Fagregren rougher flotation cells, followed by a two-cell cleaner. The cleaned sulphide flotation concentrate is stockpiled and the rougher tail is subjected to a sand-slime separation at 200-mesh in a Wemco duplex spiral classifier. Sands report to the coarse gravity circuit (Section II) and the overflow to the slime flotation (Section III).

The sands are treated in a gravity installation in Section II composed of Wemco hydraulic classifiers and Deister shaking tables. The hydraulic classifiers size the feed to each table for more uniform operating conditions. The roughing and cleaning tables in this circuit produce what is known as the "Class I" concentrate. Nearly 60 per cent of the mill feed reports to the coarse gravity section.

The fine-grained scheelite problem is handled in Section III of the mill,

which may be termed the slime-flotation operation. The feed to this circuit is composed of overflow from the duplex classifier and rougher tailing from the gravity circuit. Flotation is the principal method of concentration used in this section. The feed is conditioned with the necessary reagents, then subjected to a roughing flotation step, followed by three cleaning operations to recover fine scheelite in the overflow froth. The cleaned froth is tabled on two Deister units to make a "Class II" concentrate containing 65 per cent $WO_3$. Approximately 30 per cent of the mill feed is routed through this section.

### Sulphides Troublesome

Provisions are made for the separation of sulphides in each section of the mill in addition to the initial step following the grinding stage. In the coarse gravity circuit the rougher table concentrate is collected for the flotation of sulphides in four Agitair flotation machines and one Denver unit cell. The sulphide froth is recycled to the bulk sulphide flotation cells installed in Section I. At the head of the slime flotation circuit in Section III, a third installation is made to remove the sulphides before any attempt is made to recover the scheelite by flotation. Four 66-inch Fagregren cells are used to scalp remaining sulphides from the feed. The sulphide recovered in the froth is likewise pumped back to the bulk sulphide flotation cells.

Generally, tungsten concentrate is shipped to the General Services Administration in San Francisco, California. Some low-grade concentrate is shipped to the Glen Cove, New York plant of Wah Chang Smelting and Refining Company of America, Inc.

### Complete Shop Facilities

Wah Chang has established an almost completely self-sufficient base at Tempiute. All repair work can be done at the Lincoln mine except large lathe jobs. The machine shop houses drill presses and lathes capable of handling most ordinary work. It is also equipped to pour bearings; the largest one poured to date has been for the jaw crusher—14 inches.

The power plant installation includes four 900-horsepower General Motors marine Diesel engines which drive 700-kilowatt generators, and three 225-horsepower Chicago Pneumatic Diesel engines driving 150-kilowatt generators. Power consumption at the operation is 35,000 to 40,000 kilowatt hours daily and the Diesel engines consume 3,500 gallons of fuel per day. Thus, 10 to 11 kilowatt hours are generated per gallon of fuel.

CONTRACT MINER, Walt Noreen drills a round in a typical stope with an Ingersoll Rand Jackleg. Using this type of drill with a pusher leg, overbreak in stopes has been reduced because holes can easily be confined to ore.

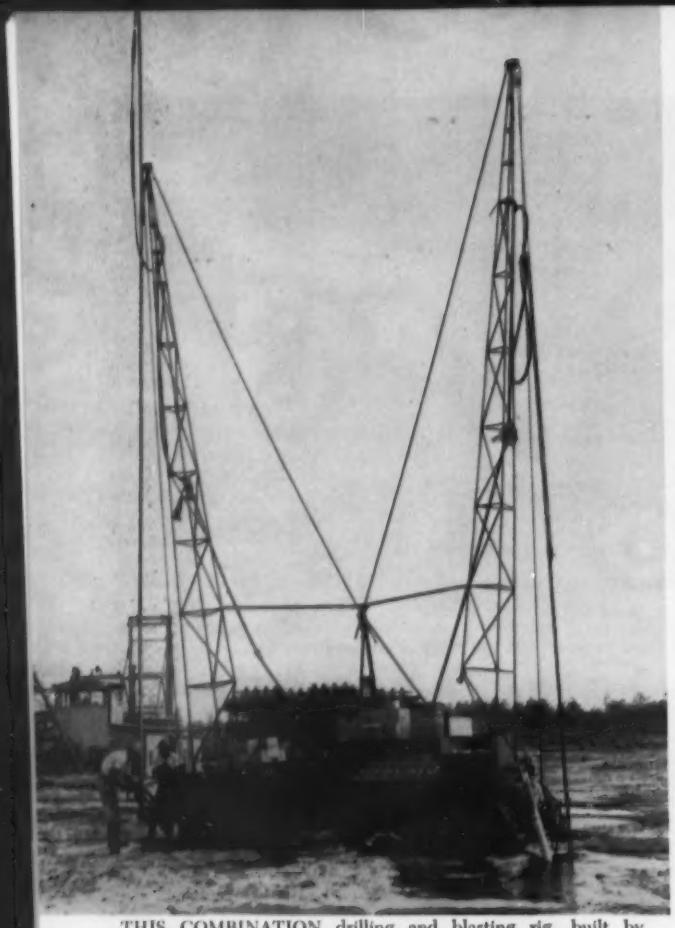
### Townsite Notes

The townsite consists of: 40 2-bedroom homes, 10 3-bedroom homes, 22 Wingfoot trailers, and nine modern Edwards trailers. The townsite also includes two trailer courts providing room for about 50 private trailers. Each trailer is supplied with water and sewage facilities. Each trailer court is equipped with a wash house, toilet, and showers.

Tempiute has a population of about 515. It boasts a 5-room school (first eight grades) with the most modern equipment available. About 100 students now attend. The town also has a boarding house, commissary, and theater in which movies are shown three times a week. Approximately 215 men are employed at the Lincoln operation.

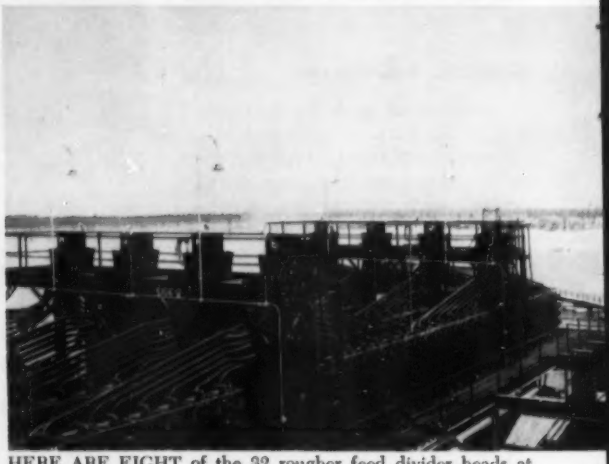
George F. Reed is assistant general manager of Wah Chang Mining Corporation, and Phil McGuire is chief metallurgist. General Superintendent of the Lincoln Division is E. G. Woods.

BIG FACTOR in increasing production per man shift is mucking machine loading of ore from shrinkage stope drawpoints. This picture shows a typical drawpoint on the 500 level with supporting posts at each side of the opening.



THIS COMBINATION drilling and blasting rig, built by Humphreys' engineers, stores all necessary blasting supplies. The twin 40-foot masts handle 50-feet of drill pipe.

FLOATING WET MILL and dredge combination produce rougher concentrate at the rate of 45 tons per hour. Final recovery is made by dry mill using magnetic separators.



HERE ARE EIGHT of the 32 rougher feed divider heads at the top of the wet mill. From each head are 30 hoses carrying the feed to one of the 5-turn Humphreys' rougher spirals.

# How New $3,000,000 Highland Plant Recovers Titaniferous Minerals

**By A. E. ROBERTS**

New York District Manager
Mining World

Another link was added to the rapidly growing chain of United States titanium mining operations last April when the second of E. I. du Pont de Nemours and Company's plants began operation. At full capacity, the new Highland Plant will have an annual production rate of 100,000 tons of titaniferous mineral concentrate.

The plant is located 39 miles southwest of Jacksonville, Florida and 1½ miles northeast of the town of Lawtey, Florida. Du Pont's other operation, the Trail Ridge plant, has been in operation since 1948 and also has a capacity of 100,000 tons of concentrate per year. The Trail Ridge operation is near Starke, Florida, a few miles south of Lawtey.

Operation of Humphreys spiral concentrators at the Trail Ridge plant were described in detail in the May 1953 issue of MINING WORLD, pages 40 through 45.

Both plants were jointly designed and constructed by du Pont and Humphreys Gold Corporation's engineering departments. The plants are operated by Humphreys under a management contract with du Pont.

### *Mining Dates to World War I*

Small amounts of the ore minerals of titanium and other heavy minerals have been found in most of Florida's beach sands. The first commercial mining operations to recover these minerals began during the first World War, but were abandoned shortly afterward because of the price declines. During the second World War, Rutile Mining Company started an operation near Jacksonville. In 1944 Humphreys took over the project and has since operated it for Rutile Mining Company.

Immediately following World War II, du Pont geologists made an extensive survey of the state and located promising areas near the present Trail Ridge plant location. In 1947, the U. S. Bureau of Mines, as part of its exploration program, and on the recommendation of du Pont geologists, located commercial concentra-

tions, at depth, when drilling on the Trail Ridge deposit.

### Ancient Shore Deposit

Trail Ridge is an ancient sand dune shore deposit. Laterally, it extends from southern Georgia on the north, down the peninsula to south of Avon Park, Florida, where the ridge gradually slopes away. The ridge, which closely follows Highway Route 27 through Florida, averages about one mile in width.

Although ilmenite and other heavy minerals occur throughout the deposit, commercial concentrations are not prevalent for the entire length. The heavy minerals occur as fine particles (minus-80-mesh) and are found from the surface to a depth of around 60 feet. Primarily, the heavy minerals are: ilmenite ($FeTiO_3$), leucoxene (altered rutile), rutile ($TiO_2$), staurolite ($HFe_2Al_9O_8Si_4O_{16}$), zircon ($ZrSiO_4$), kyanite ($Al_2OSiO_4$), sillimanite ($Al_2OSiO_4$), and a few other silicates.

Underlying the surface of the deposit and at varying depths and thicknesses, is a formation locally known as "hardpan." It consists of masses of sand cemented with a tar-like substance resulting from decomposition of vegetable growth. Hardpan, in most cases, approaches the hardness of ordinary sandstone.

As the initial step in the mining operation, the surface vegetation is cleared to prevent fouling of machinery for the ensuing operations. Tractor-drawn rakes, rooters, and discs are used after the trees and stumps have been removed. The discs cut the longer roots into lengths short enough to pass through the dredge suction line. As the minerals occur near the surface, no stripping is required.

### Drilling and Blasting Rig

Next, the packed sands must be loosened and the hardpan shattered by blasting. A combination drilling and blasting rig was built by Humphreys for this operation. With a half-track as the basic unit, 40-foot masts were mounted on the front and rear of the truck. Each mast is equipped with an electrically operated winch to raise and lower the drill string.

Drill rods are made of two sections of 20-foot, 1½-inch, double strength pipe welded together to make a 40-foot rod. An additional 10-foot section of pipe is attached to the top of the string to drill a 50-foot hole. The bit is 8 inches in diameter and has six fins.

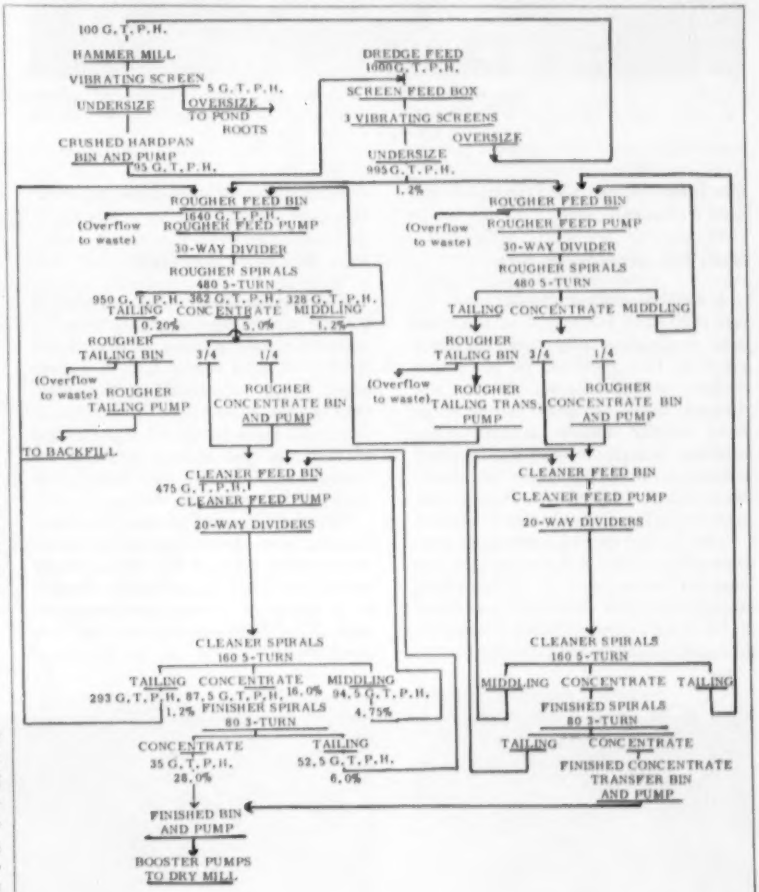
Water is pumped through the drill rods at the rate of 70 gallons per minute at a pressure of 100 pounds per square inch. Power for pumping is supplied by a portable Diesel-powered unit.

Holes are drilled by hydraulic action and churning. The combination of the water pressure and the weight of the pipe is sufficient to push the bit through the sands. However, when the hardpan is reached, it becomes necessary for the operator to chop through the harder material by raising and dropping the drill string.

The rig is operated by two men—one for each drill—and is easily and rapidly moved over the sand to a new position. Holes are drilled in rows spaced 20 feet apart and parallel to the face of the pond. About 1,000 feet of 8-inch hole are drilled in an 8-hour shift.

Blasting supplies are carried on the rig and each hole is loaded as soon as it has been drilled. Primers are attached to cans of duPont Nitramon, 4½ inches in diameter and 24 inches long, with a pressure-sensitive filament tape—a Humphreys innovation. Primacord is laced to the primer and the entire unit is lowered in the hole. Charges vary from a single primer to one primer and four cans of Nitramon.

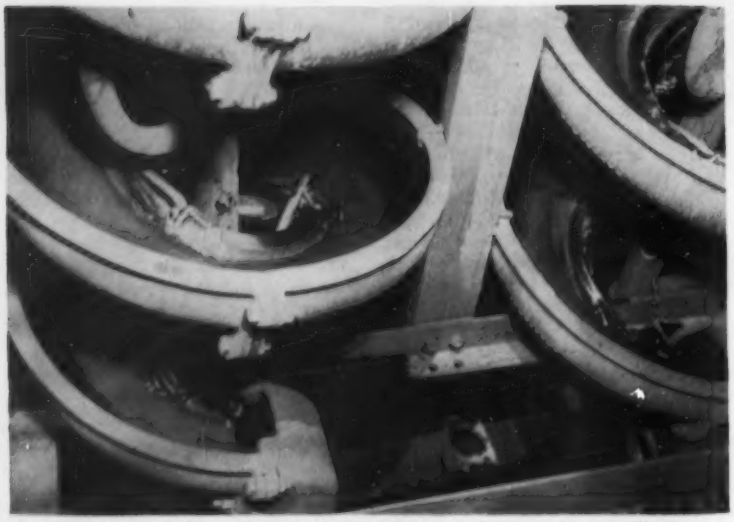
After loading, the holes are stemmed with sand and the Primacord looped around a stake. When the round is completed, millisecond delays, which




G.T.P.H. = GROSS TONS PER HOUR
% FIGURES INDICATE $TiO_2$ CONTENT

**Wet Mill Flowsheet of Highland Titanium Mineral Plant**

**Lawtey, Florida**



CLOSE-UP of one of the 3-turn finisher spirals shows the manually controlled splitter (at upper center of picture). Concentrate which hugs the inside path of the spirals is drawn off through a discharge port.

are fastened to the Primacord, are fired electrically.

### Hulls Constructed on Site

Both the suction dredge and the wet mill were fabricated at the pond site. A dragline was used to dig a pond in two sections, or steps—one shallow and one deep. Water was pumped out of the pond to below the level of the shallow section. Then cribbing was placed and the first hull plates for the dredge were laid down. Ninety days later, the shallow section was flooded and the dredge launched.

The dredge has 14 watertight compartments in the hull and is 104 feet long by 40 feet wide. It is interesting to note that over 30,000 linear feet of 8 by 8-inch timbers were needed to provide the necessary cribbing for the dredge and wet mill hull construction.

### How Dredge Operates

The dredge operates by swinging in a wide arc across the pond, with the cutterhead taking out a section of the bank with each swing. Crowd is provided by the two spuds on the stern. One spud is lowered to the bottom of the pond for a pivot. At the far end of the arc, the second spud is released and the first one raised, advancing the arc of the swing.

Swing is controlled by two lines running from the dredge to the banks on opposite sides of the pond, where each is anchored by a dragline bucket as a deadman. Swing winches powered by 75-horsepower motors are used for motivation.

Sands are dredged in a series of cuts 150 to 200 feet wide until the dredge is about 1,200 feet from the wet mill. The mill is then moved close to the dredge and another cycle is started.

Each section of sand is sampled to determine the depth of "ore" before dredging. This depth is marked on a stake, which guides the dredge operator. Present operations extend to a depth of 50 feet below the surface of the sands.

The cutterhead is 7 feet in diameter and consists of six spiraled blades with 10 teeth per blade. As the cutterhead rotates, the teeth give a continuous cutting and shaving action to penetrate the sand and hardpan.

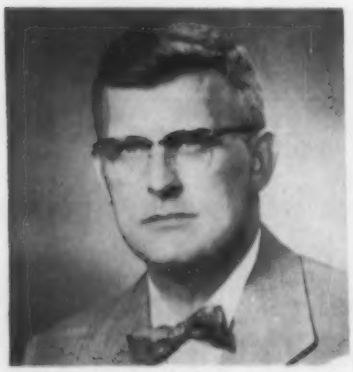
The cutterhead, which is attached to a 9-inch shaft, rotates at 18 revolutions per minute. Power is supplied by a 200-horsepower Allis-Chalmers motor through a gear reducer. The spiraling action of the blades forces the loosened material back to the rear of the cutterhead where it is pulled into the 20-inch suction pipe.

The suction pump on the dredge is the only abrasive-handling pump at the operation that is not rubber-lined. Because of the size and nature of the material handled, a special pump was required. A 20-inch Pettibone-Mulliken pump, with high chrome alloy metal parts, has proved very satisfactory.

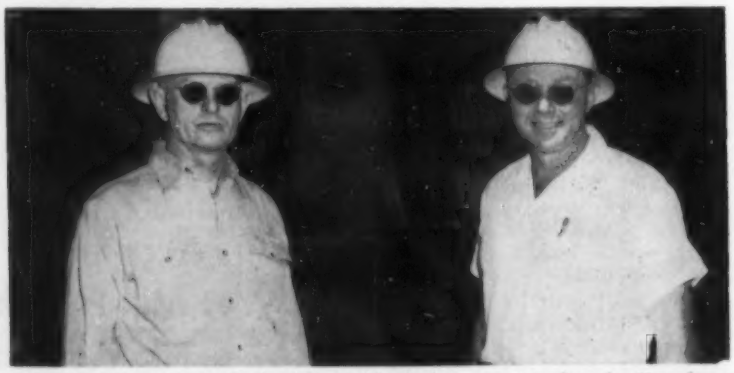
The pump is powered by a 900-horsepower A-C motor and operates at between 18 and 20 inches water gauge pressure. It pumps 1,000 tons of material-per-hour and between 18,000 and 20,000 gallons of water-per-minute to the wet mill.

### Root Hog Protects Pump

To prevent the suction pump from becoming plugged by roots from surface vegetation, pieces of branches



MANAGERIAL DUTIES at both the Trail Ridge and Highland plants are performed by E. C. Weichel, Jr.



ON THE JOB are E. S. Beebe, left, Highland plant superintendent for Humphreys Gold Corporation, and L. W. "Swede" Mathews who holds the position of production superintendent.

and other material from old buried forests, and chunks of hardpan, Humphreys engineers developed a combination crusher and wood chipper, aptly named a "root hog."

The "root hog" consists of an upward sloping screen with 5-inch holes. Undersize material, passing through the screen, goes directly to the dredge pump. Oversize is carried up the screen by the force of the stream to the crusher. The larger pieces of hardpan and roots are crushed between a fixed set of dies with 2-inch openings and a rotor with teeth that mesh with the dies. The entire unit is enclosed in a welded steel box, with the drive outside the box. The drive shaft passes through a stuffing box to prevent loss of suction. Crushed material rejoins the undersize and is carried to the dredge pump.

From the dredge, the sands are pumped to the wet mill through 40-foot sections of 24-inch-diameter pipe. Each end of the pipe is supported by floating steel pontoons, 6 feet in diameter and 15 feet long. Rubber dredge sleeves connect the sections of pipe, permitting additional joints of pipe to be quickly added or removed.

A 2,300-volt cable supplies power for the dredge and attendant units. The cable is also supported across the pond by pontoons.

### Mill Unit on Single Barge

The hull for the wet mill was constructed in the same manner as the dredge hull. The wet mill is 146 feet long and 112 feet wide. There are 62 watertight compartments in the hull.

Spiral banks and other processing equipment were installed on the hull after it was floated. Overall height of the mill, to the top of the divider headers, is 50 feet.

In contrast to the Trail Ridge concentrator, this unit was built complete on one barge. At Trail Ridge, three separate barges were used—one for screens, crusher, and the de-watering classifiers, one for the rougher spirals and accessory equipment, and the third barge for the cleaner and finisher spirals.

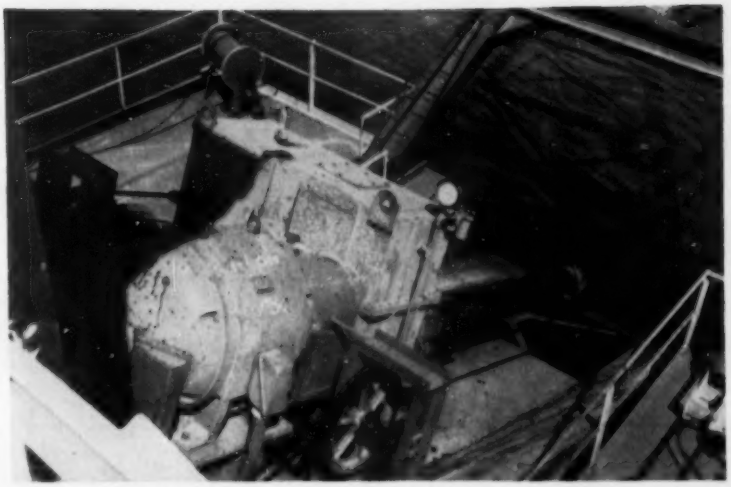
The sands from the dredge are concentrated in three spiral stages. The beach sands contain 4.3 percent heavy minerals which are upgraded to 80 percent in the concentrate leaving the wet mill. The 1,000 tons-per-hour of sand from the dredge is reduced to 45 tons-per-hour of concentrate going to the dry mill.

### Plates Used in Overflows

Plate thickeners, which are placed in the overflow of all sumps and feed boxes, are an interesting feature of the wet mill. Developed by I. B. Humphreys, the thickeners consist of a parallel series of 12 gauge metal plates 24 inches square and three-quarters of an inch apart. The plates are placed sideways in the stream so that the edge of each plate makes an angle of 60° across the stream and the surface of each plate is parallel to the current flow.

With the plates so arranged in the overflow stream, the maximum distance required for any sand particle to settle before reaching the surface of a plate would be slightly over three-quarters of an inch. Once the particle touches the plate, it slides down to the bottom. In this manner, the slower settling particles, that would otherwise be lost in the overflow, are recovered.

The sands from the dredge are screened by three Allis-Chalmers vibrating screens with one-quarter-inch openings. Oversize is reduced by a Jeffrey 36 by 36-inch hammer mill operating in a closed circuit. After screening and crushing, the undersize goes to one of two rougher feed bins. From these bins the sands are concentrated in two parallel circuits.

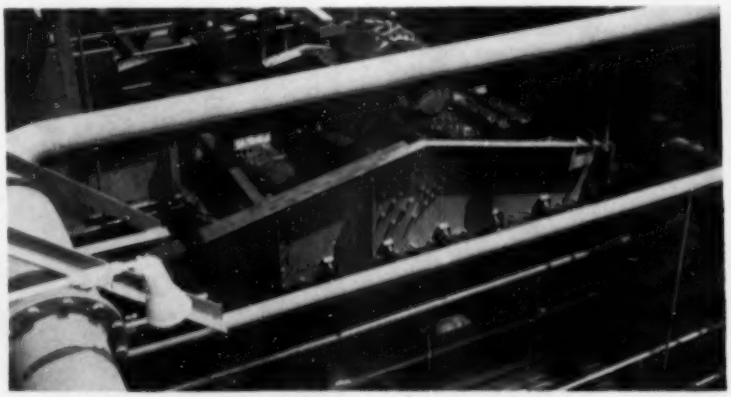


CUTTERHEAD MOTOR (200-hp.) supplies the power to rotate the cutterhead at 18 r.p.m. The dredge operator, guided by the markers on the bank, controls the depth at which the cutterhead operates.

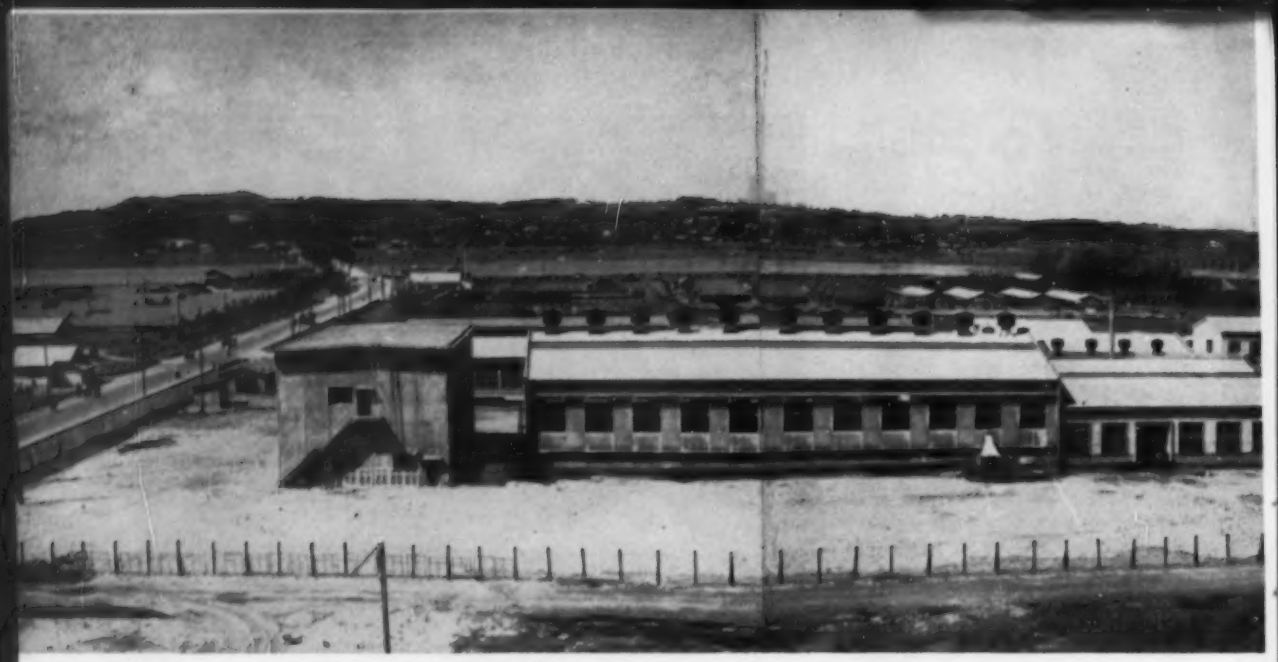
### World's Largest R-L Pumps

The rougher feed pumps, which pump the sands to the top of the mill, are unique in regard to their size. Prior to construction of the Highland Plant, the 16-inch, rubber-lined pumps used at the Trail Ridge plant had the distinction of being the largest rubber-lined pumps manufactured. These pumps were built by Georgia Iron Works in Augusta, Georgia. However, for the Highland Plant, Georgia Iron Works surpassed its

Continued on page 72



SCREENING of the wet mill dredge material is done by three shaking screens, one of which is pictured here. Oversize is reduced by a hammer mill. Undersize from screens and hammer mill is pumped to the rougher feed dividers at top of wet mill.



MITSUBISHI'S AKITA CITY, Japan, electrolytic zinc plant is one of the world's newest and most modern operations for producing high purity, cathode zinc. The plant treats a wide variety of zinc concentrates, some of them extremely high in

# How Mitsubishi's New Akita Plant

**By KATSUJI NAKANISHI**

One of the world's newest and most modern electrolytic zinc plants has been in operation at Akita City, Japan since January 1954. The plant was designed, built, and is operated by the Mitsubishi Metal Mining Company, Ltd. Akita City is in the extreme northwestern part of Honshu, the main Japanese island, and is 600 kilometers north of Tokyo.

This plant is unusual in that it treats a wide variety of concentrates which are extremely high in copper, tin, arsenic, and antimony in comparison with feed to other electrolytic zinc refineries. The plant has a rated capacity of 20 metric tons of 99.99715 percent zinc per day, and output is to be doubled.

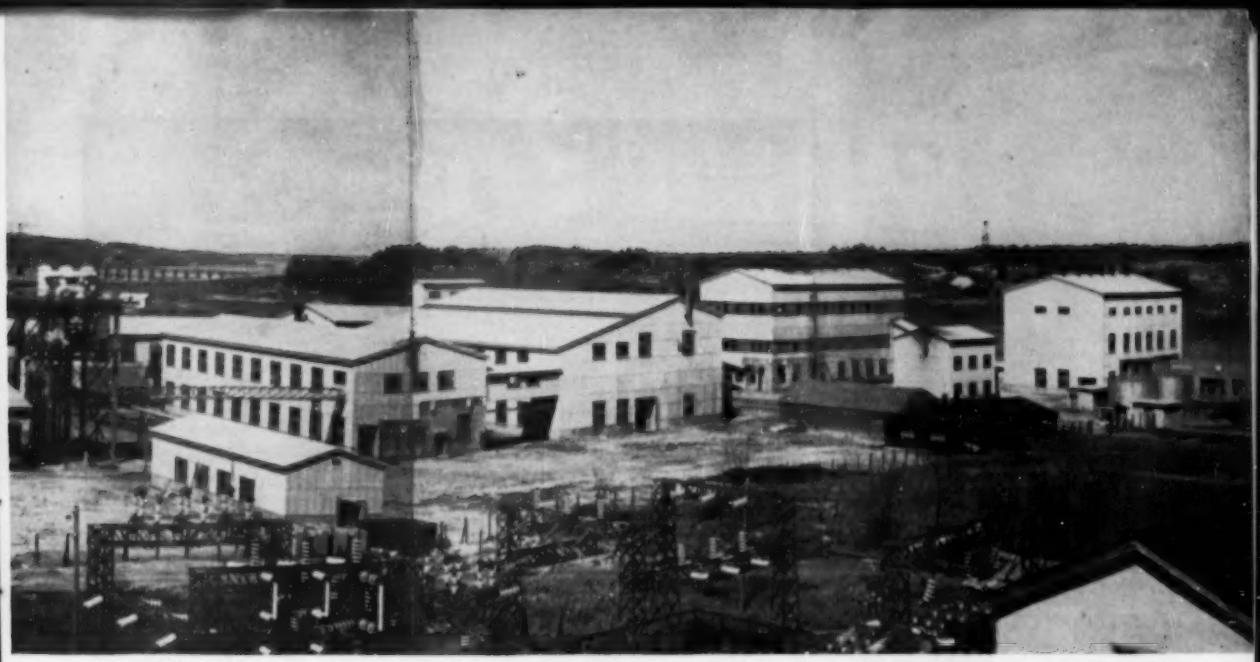
The plant site was selected with respect to ore and power supplies, and marine transportation on the adjoining river. The site, including 2,000-metric-ton ore storage house, roasting plant, leaching plant, purification plant, tank house, melting and casting plant, 500-kva power station, residue treatment plant, office and assay laboratory, and other accessories buildings, covers 22 acres.

Although small tonnages of custom zinc concentrates have been treated, the plant was originally designed for the purpose of processing the concentrates from Mitsubishi's Ikuno and Akenobe mines in southern Japan. Both are complex sulfide mixtures with a wide variety of impurities, and are particularly high in copper. When roasted, they have a strong tendency of sintering at about 850° C. This is supposedly due to the combined effects of copper or lead with arsenic, but has not yet finally been proven.

During 1934 to 1943 the concentrates were treated at Mitsubishi's Naoshima central smelter on an island in the Japan Sea. There, usual 10-hearth mechanical agitation roasters were installed for roasting. Serious troubles resulted from freezing up of the hearth beds every six to nine months forcing operations to stop while sintered bed ore was removed and the rabble arms were cleaned. The technical troubles were aggravated further by power shortage in the district and the plant was closed in 1943.

**Mr. Nakanishi is assistant manager, Akita zinc plant, Mitsubishi Metal Mining Company, Ltd., Akita, Japan. Member AIME.**

AUTHOR K. Nakanishi, assistant manager of the Akiat electrolytic zinc plant, stands between H. Nakayama, manager, (left) and Y. Nohara, Mitsubishi's interpreter. Mr. Nakanishi is an excellent photographer and took panoramic picture of plant at top of page.



copper. Material flow is from the storage bins at the far right to the electrolytic tank house in left foreground. Note the modern designed and well maintained buildings and plant area which contain the processing facilities.

# Makes 99.997% Electrolytic Zinc

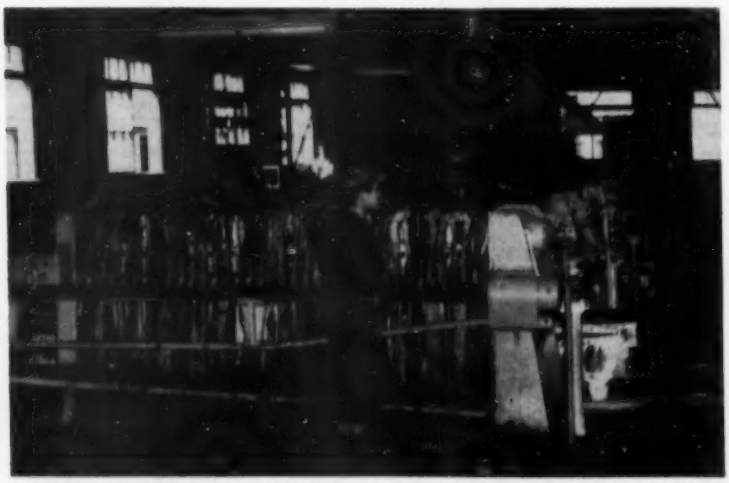
In 1951 the FluoSolids process for roasting the concentrates was studied at the Westport, Connecticut plant of the Dorr Company. The result was promising and it was decided to apply it at the new plant. In the actual operation, stable roasting conditions and improved metal recoveries are presently being obtained.

The flow sheet of the plant is included with this article. Hydrometallurgically, a low density and low acid process is used. The entire system is designed to be continuous and mechanized. Double leaching and a continuous 3-stage purification process precede electrolysis. The zinc slab produced is certified to be more than 99.997 percent pure.

### *Preparation of Raw Materials*

Four kinds of concentrates are treated at present. Their typical assays are shown in Table No. I. With regard to Ikuno and Akenobe concentrates, the copper, lead, and arsenic contained therein are restricted to 2.2, 1.5, and 0.5 percent, respectively.

The concentrates, received by rail, are unloaded from cars by a grab crane and stored in four 500-ton-capacity bins. They are discharged onto a belt conveyer, weighed by a Merrick FeedoWeight, and then discharged into a log washer, a type of horizontal shovel mixer, where concentrates are repulped with water to obtain an 80 percent solid slurry. The prepared pulp is pumped, by a Wilfley pump, into an agitation tank, 10 feet in diameter by 14 feet high. Compressed air is induced into the tank through the hollow shaft of the agitator to keep the pulp from settling.



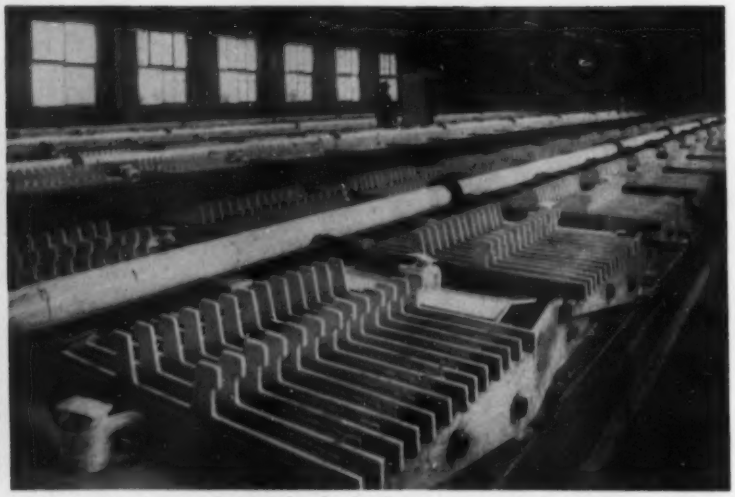
FILTER PRESSES in the purification section. Separation of cement copper and cadmium-bearing cake is made in these presses in successive filtering stages. Nylon filter cloths have a life of six months. There are four filter men per shift.

### *Roasting*

A Dorr FluoSolids reactor, 14 feet in diameter by 17 feet high, is used for roasting. The raw slurry is discharged from the agitation tank to a small head tank, then, by a Moyno slurry pump and compressed air, spread over bed surface through a 1-inch-diameter nozzle. The air required for fluidizing and burning the ore is supplied by a 100-horsepower turboblower which forces the air through orifice nozzles inserted in the bed plate at a velocity of 45 centimeters per second.

The bed temperature is kept at 930°C; automatically adjusted by feed water control. The reactor roasts

DORR FLUOSOLID REACTOR (lower left.) Reactor has been solution of a bad sintering problem on high-copper feed.



TANK HOUSE interior showing details of cell arrangement, feed piping, and discharge launders. Cells are constructed of ferro-concrete and lined with lead and acid-proof brick. Oil-free soya bean powder is used effectively for mist prevention.

50 metric tons of concentrate per day replacing four Herreshoff roasters of about the same size. There is no sintering trouble now.

The roaster gas, bearing fine calcine, passes to a waste heat boiler for heat recovery and then to a 2-stage cyclone for dust collection. Due to the unusual sticking property of the calcine, choking troubles in the boiler flue were often an initial problem and most of the water tubes were later rearranged into a pipe-wall type. On the other hand, the cyclone collecter maintains a 99.0 percent, or more, efficiency for the same reason.

The exhaust gas is then cooled and washed with water by a Peabody scrubber, and forced by a 40-horsepower turboblower through an underground pipe to the Fertilizer plant 600 meters away. The liquor from the Peabody scrubber is discarded after neutralization with limestone. Zinc loss in liquor is about 0.3 percent. When the operation started, severe corrosion by the humidified gas attacked the blower's runner made with stainless steel plate (ASTM316). The shortest life was 12 hours though it was lengthened to two weeks by the addition of a water spray on its surface. The corrosion problem was solved by replacing the stainless steel with Stellite alloy. Sulfur dioxide concentration in the gas shipped to the fertilizer plant is kept at 7.0 per cent by volume. Sulfur recovery in the gas is 76 percent.

General figures of the calcine distribution are as follows: reactor overflow, 45 percent; waste heat boiler, 10 percent; cyclones, 44 percent; Peabody scrubber, 0.3 percent; and carry over to acid plant, 0.005 percent. The reactor overflow is cooled in a rotary cooler and then pulverized to minus-40-mesh together with the boiler dust, while the cyclone dust is sent directly to the leaching plant by a belt

**Table No. I**

**Analysis of Typical Zinc Concentrates Refined at Mitsubishi Metal Mining Company Ltd's. Akita City, Japan Electrolytic Zinc Plant**

| Constituent | Ikuno Mine | Akenobe Mine A | Akenobe Mine B | Osarizawa Mine | Toyoha Mine |
|---|---|---|---|---|---|
| Au[1] | 0.7 | 0.3 | 0.3 | 0.8 | 1.5 |
| Ag[1] | 341 | 199 | 193 | 42 | 480 |
| Cu[2] | 1.75 | 1.58 | 1.88 | 1.20 | 0.27 |
| Pb[2] | 1.24 | 0.93 | 0.32 | 2.63 | 1.67 |
| Zn[2] | 51.21 | 53.60 | 53.75 | 57.41 | 54.35 |
| Fe[2] | 7.68 | 7.83 | 7.85 | 4.24 | 6.69 |
| S[2] | 29.41 | 30.02 | 29.13 | 32.36 | 32.38 |
| Cd[2] | 0.28 | 0.25 | 0.27 | 0.34 | 0.20 |
| Sb[2] | 0.030 | 0.087 | 0.080 | 0.024 | 0.032 |
| Sn[2] | 0.105 | 0.086 | 0.077 | Trace | 0.045 |
| Bi[2] | 0.006 | 0.004 | 0.003 | Trace | Trace |
| Ni[2] | Trace | Trace | Trace | Trace | Trace |
| Co[2] | 0.004 | 0.004 | 0.004 | Trace | Trace |
| As[2] | 0.57 | 0.48 | 0.46 | 0.01 | 0.11 |
| $SiO_2$[2] | 5.80 | 3.00 | 3.40 | 0.58 | 2.90 |
| $Al_2O_3$[2] | 1.05 | 0.81 | 1.16 | 0.37 | 0.42 |
| MgO[2] | 0.05 | 0.07 | 0.07 | 0.01 | 0.03 |
| CaO[2] | 0.37 | 0.08 | 0.08 | 0.08 | 0.08 |
| Mn[2] | 0.053 | 0.078 | 0.099 | 0.068 | 0.105 |

1. Grams per metric ton. 2. Percent.

**Table No. II**

**Average Assays of Calcines For June 1955 at Mitsubishi Metal Mining Company Ltd's. Akita City, Japan Electrolytic Zinc Plant**

| | Cu | Pb | Zn | Fe | Cd | $SiO_2$ | As | Total S | Sulfide S | Sulfur as $SO_4$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Reactor overflow[1] | 1.78 | 1.19 | 61.94 | 8.83 | 0.40 | 3.93 | 0.16 | 0.69 | 0.27 | 0.42 |
| Cyclone dust[1] | 2.14 | 1.73 | 58.66 | 7.62 | 0.38 | 3.79 | 0.11 | 2.24 | 0.07 | 2.47 |

1. In Percent.

**Table No. III**

**Typical Assays of Solutions at Mitsubishi Metal Mining Company Ltd.'s. Akita City, Japan Electrolytic Zinc Plant**

| | Zn[1] | Cu[2] | Fe[1] | Cd[2] | Sb | Sn | Ni | Co[2] | As[2] | Mn[2] | Cl[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Thickener overflow | 109.5 | 1.34 | 7.7 | 340 | Tr | Tr | Tr | 7.0 | 1.3 | 595 | 45.0 |
| Purified solution | 109.8 | Tr | 7.8 | 0.3 | Tr | Tr | Tr | 2.4 | Tr | 599 | 40.0 |

1. Grams per liter. 2. Milligrams per liter.

**Table No. IV**

**Assays of Leached Zinc Residue During April 1955 at Mitsubishi Metal Mining Company Ltd's. Akita City, Japan Electrolytic Zinc Refinery**

| Component | Amount | Component | Amount |
|---|---|---|---|
| Au[1] | 1.17 | Sn[2] | 0.29 |
| Ag[1] | 1.083 | As[2] | 0.78 |
| Cu[2] | 2.54 | $SiO_2$[2] | 13.88 |
| Pb[2] | 4.90 | $Al_2O_3$[2] | 1.28 |
| Zn[2] | 20.16 | MgO[2] | Trace |
| Fe[2] | 26.31 | CaO[2] | 0.24 |
| Mn[2] | 0.39 | Total sulphur | 2.43 |
| Cd[2] | 0.20 | Sulfide sulphur | 0.71 |
| Sb[2] | 0.19 | Sulfate sulphur | 1.72 |

1. Grams per metric ton. 2. Percent.

**Table No. V**

**Analysis of Electrolytic Zinc and Electrolytic Cadmium Produced by Mitsubishi Metal Mining Company Ltd's. Akita City, Japan Refineries During June 1955**

| Metal | Percent ELECTROLYTIC ZINC | Percent ELECTROLYTIC CADMIUM |
|---|---|---|
| Zinc | 99.99715 | 0.0127 |
| Copper | 0.00015 | 0.005 |
| Lead | 0.0016 | 0.0116 |
| Iron | 0.0005 | 0.0010 |
| Cadmium | 0.0006 | 99.97 |
| Tin | 0.0000 | |
| Silicon | 0.0000 | |

conveyer. Typical assays of the roasted ores are shown in Table No. II.

### Leaching

Major equipment consist of two spent solution reservoirs, 6 meters in diameter by 4.6 meters high; two mixing tanks, 2 meters in diameter by 1.5 meters high; four conical-bottomed leaching tanks, 4 meters in diameter by 6.2 meters high; two drag belt classifiers; two thickners, 15 meters in diameter by 2.5 meters in depth; and three Oliver filters, 2.4 meters in diameter by 3 meters long. All operating tanks are made of ferro-concrete, lined with lead sheets and acid proof brick, and provided with rubber lined agitaters. The classifiers, Oliver filters, and the thickener surface are covered with plastic sheet to protect the room from condensing moisture, and to maintain the solution temperature. To simplify transportation, calcine and residues are all slurries, not solids. The final cake from Oliver filter is also pumped by a sand pump to a stock yard.

Continuous double leaching processes are applied. The calcine, weighed by a hopper scale, is continuously charged into a mixing tank where it joins spent electrolyte from a storage tank, and goes into the neutral leaching tank. It passes through a classifier going to the neutral thickener. Spigot discharge from the classifier and the thickener is treated in three acid leaching tanks, in an acid thickener, and two-stage Oliver filters. Acid consumption is 80 percent for the neutral leach, and 20 percent for the acid leach. Compressed air and manganese dioxide are used to oxidize soluble iron in the acid zone. Potassium permanganate for removing trace iron and as a settling reagent for the thickener is added in the neutral tank.

The extractions of zinc, cadmium, and copper from the calcine are 89.5 percent, 82.4 percent, and 61.5 percent, respectively. Assays of the leached solution, and the filter residue are shown in Table Nos. III and IV. Nylon cloth used for the Oliver filter withstands the solution longer than two months. Two men each shift operate the leaching process and another two act as filter men.

### Purification

Six reaction tanks, 4 meters in diameter by 3.8 meters high, and six wooden plate filter presses, each 30 by 30 feet with an oil accumulator of 1,500 pounds per square inch capacity, are installed. The specification of tanks is about the same as the leaching tanks.

An outline of the purification stage is as follows:

(1) Heating the thickener overflow by an instantaneous heating device to above 70°C.

(2) Addition of arsenic white for cobalt removal.

(3) Addition of enough blue powder to precipitate copper together with cobalt.

(4) Filtration to separate cement copper.

(5) Recycling final filter residue into copper-free filtrate to increase cadmium concentration in the residue.

(6) Second filtration to obtain cadmium-bearing cake.

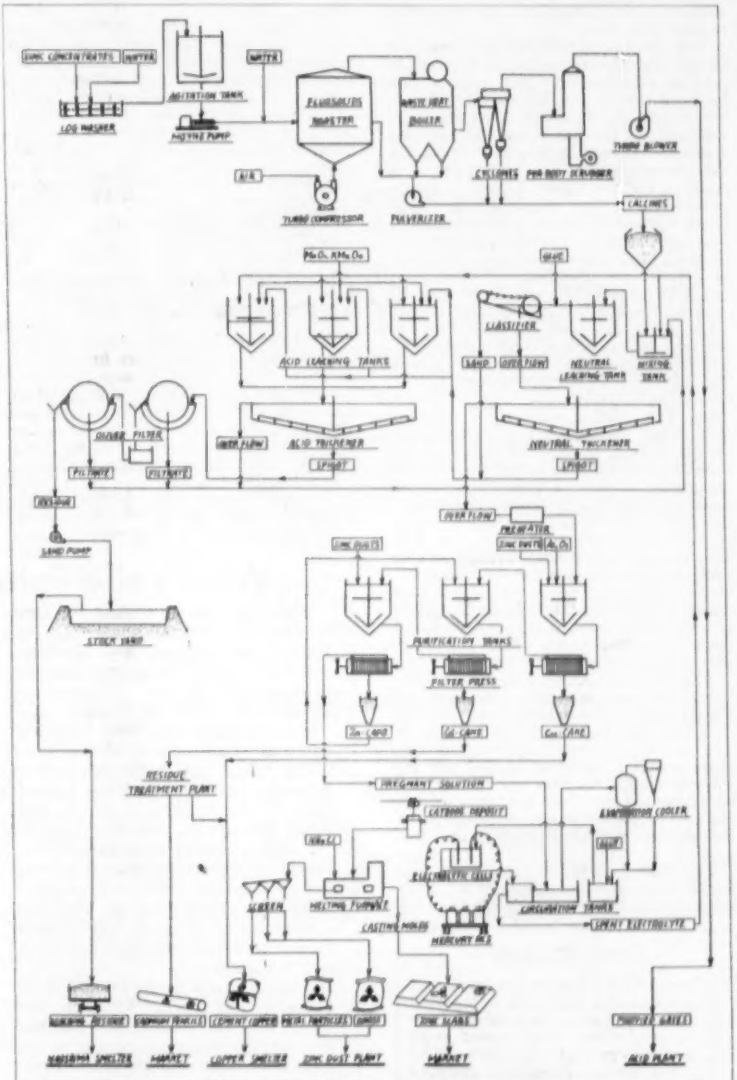
(7) Addition of fresh blue powder to precipitate the last trace of cadmium.

(8) Third filtration. The residue is recycled at the second purification.

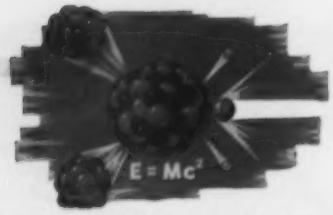
The operation through the three stages is carried on continuously. Every two hours copper, cadmium, and cobalt in the solution are analyzed to check blue powder feed.

Cement copper from the first stage contains 43.6 percent copper, 11.5 percent zinc, 2.1 percent cadmium, and 0.2 percent cobalt. It is shipped to a copper smelter. Residue from the second stage, assaying 22.3 percent

Continued on page 70




**Flowsheet of Mitsubishi Metal Mining Company Ltd's Akita Electrolytic Zinc Refinery Akita City, Japan**




# FISSION FACTS

**Monthly Roundup of Mining News In the Atomic Energy Field**

## International "Atoms for Peace" Agreements Call for Exchange of Information, Materials

Agreements covering the civil uses of atomic energy have been signed by the United States and the governments of Belgium, Brazil, Canada, Colombia, Switzerland, and the United Kingdom. Basically, the "atoms for peace" program is an exchange of information and materials for the furtherance of peaceful atomic energy research and industrial reactor programs.

The Belgian agreement continues existing commercial contracts relating to sale of uranium ores and concentrates between the African Metals Corporation, which acts for Union Miniere du Haut Katanga and the Combined Development Agency, uranium purchasing agent for the governments of the United States of America and the United Kingdom. It also provides that the Combined Development Agency will have a first option to purchase 90 percent of the uranium and thorium ores and concentrates produced in Belgium and the Belgian Congo during 1956 and 1957, and 75 percent of ores and concentrates produced during 1958, 1959, and 1960. In 1960 Belgium will analyze its needs and consult with the United States on the percentage of ores and concentrates to be offered to the Combined Development Agency thereafter. The AEC has promised Belgium that it will receive as much atomic information from the United States as any country except Canada. Belgian technicians will be able to work on industrial reactor projects in the United States, and the AEC will sell U-235 isotopes, heavy water, etc. for use in Belgium, the Belgian Congo, and Ruandi-Urundi reactor projects. The AEC has the option to purchase any special nuclear materials produced in Belgium, the Belgian Congo, or Ruandi-Urudi from materials purchased from the United States which are in excess of Belgium's peaceful needs.

The ten-year Canadian agreement provides for an extensive exchange of non-military information and nuclear materials and sale of U-235 isotopes to the Canadian government in addition to other uranium isotopes needed for reactor programs. Former agreements will be continued for their duration—including sale of heavy water, plutonium, etc. for reactor projects between the two nations.

The United Kingdom agreement, also for 10 years, calls for exchange of peaceful information concerning reactor projects, uranium and thorium, plus exchange of other nuclear materials and research facilities. The contract does not provide for sale of South African uranium controlled by the United Kingdom.

Brazilian and Colombian agreements are similar, providing for information exchange and a supply of U-235 for the reactor programs.

An agreement with Switzerland includes the sale of the United States industrial reactor which was part of the U.S. exhibit at the United Nations International Conference on Peaceful Uses of Atomic Energy at Geneva to the government of Switzerland for $180,000. The United States has agreed to lease U-235 isotopes for initial and replacement fuel and to set up a non-military information exchange with the government of Switzerland for the duration of the five-year contract.

### CORRECTION

Climax Molybdenum Company, not Climax Uranium Company as reported in MINING WORLD, September, Page 83, is conducting development work on uranium property in Alaska. The firm has moved drills and supplies onto the Ross-Adams claims on Prince of Wales Island and is drilling to check the mineralization at depth.

## More Zirconium, Hafnium To Be Procured by AEC

Next month the United States Atomic Energy Commission will ask for delivery of up to 2,000,000 pounds of zirconium metal and for as much hafnium metal as can be produced in the processing of the zirconium. The additional quantities are needed to meet requirements of the AEC reactor development program and currently-scheduled Naval projects.

Plans call for 2,000,000 pounds of high purity zirconium over a 5-year period or 1,200,000 pounds in three years. Companies must present proposals by February of next year with deliveries commencing by July 1957. This program is in addition to the AEC contract with Carborundum Metals Company, Inc., of Akron, New York, for delivery of 200,000 pounds of zirconium and 4,000 pounds of hafnium per year.

Simultaneous with the AEC's announcement of increased use of zirconium in reactor projects comes a report from Westinghouse Electric Corporation's atomic power division that a new zirconium alloy has been developed, which is so resistant to the corrosive action of high temperature, high pressure water used in nuclear reactors that in a year's time only 0.0001 of an inch of corrosion can be measured. Westinghouse's new zirconium alloy contains 1.5 percent tin, 0.12 percent iron, 0.10 percent chromium, and 0.05 percent nickel.

## British Firms To Begin Central Africa U-Ore Hunt

British mining companies are reported to be starting a big-scale search for uranium in Central Africa. One uranium mine in Northern Rhodesia is already in production, the Mindola section of the Nkana mine operated by Rhokana Corporation, Ltd. Enough uranium-bearing oreshale was discovered in 1952 to warrant a small treatment plant, which is now under construction.

Geological conditions are believed to be particularly favorable for prospecting in the Sinoia district of Southern Rhodesia. Several uneconomic occurrences of ore have led to speculation of commercial discoveries being made in the future.

## What's the Future for Uranium?

Since the recent United Nations "Atoms for Peace" conference in Geneva, Switzerland, there has been much discussion about the future of uranium as the No. 1 source of atomic fuel. Use of thorium and other materials had been heralded as an eventual replacement for uranium, which has provided such a booming industry in the United States, Canada, parts of Africa, and other Western nations. Top men in the atomic energy field, however—the operators who produce uranium, the governments who buy it, and the industrial representatives who are converting it to peacetime uses—agree that uranium's importance has not diminished.

United States operators still have a guaranteed market for their ore until 1962, and most predictions are that by that time demand will be up, not down. Six large industrial reactor projects are now underway to convert the fuel to commercially feasible peacetime uses. U. S. Atomic Energy Reports are full of news of processing mill expansions and construction, and by the end of this year the AEC expects to have 17 ore-buying and sampling stations in operation.

An added factor in this continued government interest is that close control of uranium production and purchasing is a certainty as long as there is any danger of war.

It is now agreed that discussions of possible substitutes for uranium as an atomic fuel at the Geneva conference have generally been overemphasized. Thorium is a possible competitor, but it is not fissionable without U-235, and so far the AEC has been content with the thorium it gets from rare earth firms. India, which has the largest supply of monazite sands from which thorium is obtained as a byproduct of rare earths, refuses to export it on the grounds that the thorium may be used for war purposes.

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# The Engineer's Field Report

CASE HISTORY
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FIRM *Arizona Sand & Rock Co., Phoenix, Arizona*

## Sleeve taper only .0045" after 150,000 miles hauling under tough conditions

This Mack tractor's 200 h.p. Cummins diesel went in for its first overhaul after four years hauling heavy equipment to and from Arizona construction jobs. The rig hauls loads up to 25½ tons in on-and off-highway work. Using RPM DELO Special Lubricating Oil since new, inspection after 150,000 miles showed oil return holes clear, all rings free and in good condition, maximum sleeve taper only .0045". Manley Johnston, Shop Foreman, Arizona Sand & Rock Co., reported, "The engine was really clean! It could have gone at least 50,000 more miles."

Arizona Sand & Rock, general contractors for road building projects and operators of a large plant, works its equipment in constant dust and grit...in desert and mountainous terrain. The company depends on RPM DELO Oils to give the protection these heavy-duty engines need under these tough conditions.

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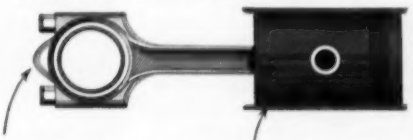

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OFFICERS OF IDAHO MINING ASSOCIATION for 1956 are from left to right: L. E. Traeger, Anaconda Company, president; Harry Marsh, secretary-treasurer; R. E. Sorenson, Hecla Mining Company, director; M. C. Brown, Sidney Mining Company, director; Roger McConnell, Bunker Hill and Sullivan Mining and Concentrating Company, director; and E. B. Douglas, Calera Mining Company, director. Vice presidents not pictured are J. C. Kieffer, American Smelting and Refining Company, and Josiah Work, Westvaco Minerals Company.

# Idaho Convention — All About the Atom, and All Kinds of Recreation

The bi-annual Idaho Mining Association's convention is unique among all conventions of the mining industry because it combines equal opportunities for industry-wide meetings with a large variety of sports and entertainment. This year's convention held at Sun Valley, Idaho on September 8 and 9th was no exception, and the Atomic Energy sessions were as popular as the golf tournament sponsored by the Colorado Fuel and Iron Company.

### The Atomic Theme

The theme of the convention was "The Atom" with the program designed to carry through from the finding and mining of uranium ore, to its utilization in nuclear reactors, and on to the ultimate goal of atomic energy for commercial electric power.

With the convention following closely after the Geneva, Switzerland, International Conference on the Peaceful Uses of Atomic Energy at which so much information on uranium and its uses had been declassified, a special report on reactors was of great interest. This report was given by Dr. R. L. Doan, manager, atomic energy division, Philipps Petroleum Company which has an operating contract at the AEC's National Reactor Testing Station at Arco, Idaho. In addition to participating in the Geneva Atoms for Peace Conference, Dr. Doan has worked on the Experimental Breeder Reactor, Materials Testing Reactor, and the Submarine Thermal Reactor (*Nautilus* power plant). He was very optimistic about harnessing the atom for the benefit of mankind, and also saw a possibility of thorium as a nuclear fuel when he said " . . . It might also mean that thorium, as well as uranium, would become important as a nuclear fuel resource since fissionable uranium-233 can be produced from thorium by exposure to reactor neutrons."

### Six Uranium Mills Pending

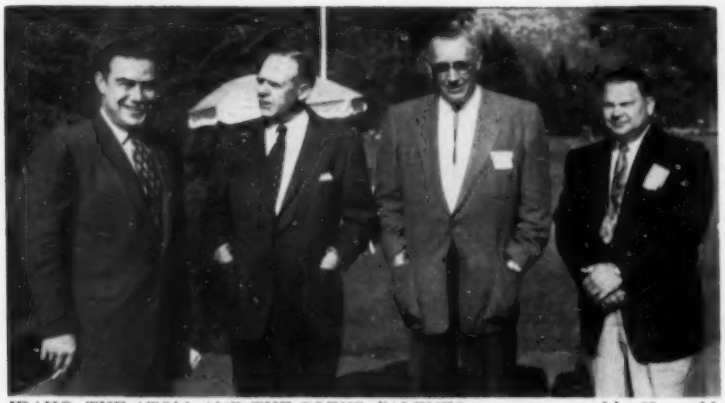
Sheldon P. Wimpfen, manager, Grand Junction Operations Office of the United States Atomic Energy Commission, assured the audience that there was plenty of uranium available for the immediate future, but that all presently known ore deposits would be mined out in 10 years. Therefore, prospecting and exploration must be maintained at a high rate.

He further reported that there were six pending additional private uranium processing mills now under consideration by the AEC. He concluded on an optimistic level for the uranium miners when he said "There may well be further extensions of the guaranteed market under the defense program."

### Western Metals Views

Otto Herres, vice president of the Combined Metals Reduction Company, Salt Lake City, Utah, and chairman of the National Lead and Zinc Committee, presented "Western Views on the Metals Outlook." He said that, "In domestic matters the west looks with less patience on the 'Welfare State' and with no great favor toward the centralization of power in Washington . . . Viewpoints may differ but American miners must have an even break with foreign producers in matters of competitive trade and government consideration if they are to continue the struggle to develop and produce the natural wealth of the nation."

Speaking of lead and zinc and the President's stockpile program, he said, "Imports for the first half of this year came in at the same excessive rate of a year ago despite the President's admonition that foreign producers were not to take advantage of the stockpile



IDAHO, THE ATOM, AND THE COEUR d'ALENES were represented by Honorable Robert E. Smylie, governor of Idaho, left; R. L. Doan, manager, Atomic Energy Division, Phillips Petroleum Company; R. W. Neyman, general manager, Hecla Mining Company; and Norman Sather, mill superintendent, Hecla Mining Company. The Governor, a strong mining booster, spoke on Idaho's mineral wealth.

FIND YOUR FRIENDS—or yourself—in group picture taken in front of the Opera House. Picture is a long-standing tradition.

WAITING FOR THE SESSIONS to begin are the miners. This is the one informal, business, and good-time convention of the year.

program. Stockpiling alone will not cure excess tonnages of foreign lead and zinc flowing to this country any more than it will in the case of farm products."

Dynamic, young, and able Idaho Governor Robert E. Smylie opened the convention with a call for governmental encouragement for the exploration and development of minerals. He foresaw the forthcoming Governor's Mineral Conference called by Governor Goodwin J. Knight of California as the logical place to formulate such a plan. In closing he pledged Idaho's support in determining a strong all-embracing national mineral policy.

Dr. J. D. Forrester, Director of the Idaho Bureau of Mines and Geology, Moscow, Idaho, spoke on the "The Present and Future Role of Industrial Mineral Materials in Idaho." He outlined the importance of Idaho's phosphate and said that "Idaho is on the threshold of an industrial minerals era . . . and that first major expansion was due for the utilization of the high alumina clays of north Idaho."

### *Titanium From Idaho*

A review of titanium was presented by Dr. J. L. Gillson, chief geologist, E. I. du Pont de Nemours and Company, Wilmington, Delaware. He reported that rutile was temporarily in short supply in the United States. Also that the titanium pigment and metal industry was growing rapidly and that increasing production of rutile at a favorable price would be a problem. He further stated that in his opinion the Oaxaca, Mexico rutile deposit was not as good as it sounded, and that it would be at least a year or two before real production would be forthcoming there. He commended the research work done by the U. S. Bureau of Mines at Albany, Oregon on the metallurgy of Idaho ilmenite. The Bureau has used wood chips as a fuel and successfully produced an 80 percent $TiO_2$ slag remarkably free of calcium or aluminum which makes so many slags from other ilmenites sticky, thus precluding their commercial use.

Dr. Gillson closed with the statement that Idaho's ilmenite would grow in importance; that it is quite possible that as titanium metal production grows, Idaho dredges will supplement rutile (now largely imported from Australia) and compete with the forthcoming Mexican rutile in furnishing concentrate to the metal producers.

The next meeting of the Idaho Mining Association is scheduled for mid-July 1957. Hope you all can be there to enjoy the sports and program.

# The Las Vegas Treatment

**By J. M. TAYLOR**
News Editor
Mining World

This year's meeting of the American Mining Congress will emphasize fun as well as instruction! Fabulous Las Vegas, Nevada is the convention city, and its own unique facilities are at the disposal of every mining delegate.

The technical excellence of the program is well known to anyone who has ever attended an AMC meeting, but this year miners can sample the famous "Las Vegas Treatment" at the same time. This is a town where entertainment is big business. Everything is slanted to give you the feeling of luxury and relaxation. Comfort is the keynote. "Come as you are" is more than a slogan—it's a way of life. For a few days you can "let go" in a city whose chief concern is your pleasure. Its every aim is to make your stay as pleasant as possible. The food, the entertainment, the accommodations—even the gambling—are designed to make Las Vegas the most desirable place for you.

If you haven't been to Las Vegas in the last five years, don't think you know the town, 'cause you don't! What was once a group of small and large gambling halls with a few plush palaces, is now miles and miles of fabulous hotel-motel-gambling casino combinations. With so many glittering invitations to glamorous floor shows, it's hard to decide how to spread a short visit over so many enticing attractions.

Fortunately, the town operates 24 hours a day, so you can set your own schedule. If you are the night owl type you can catch the complete 49¢ breakfast at the Silver Slipper before 6 a.m. . . . that is, if you haven't already stuffed yourself at one of the sumptuous chuck wagon buffets served at most of the leading "Strip" hotels. There's all kinds of food for any hour of the day or night.

Be sure to make advance reservations for any shows you want to see. There are two show schedules in most of the clubs. The 8:15 is the dinner show and it's a smart idea to come an hour early for this one so you can have your dinner served in leisurely fashion before your appetite is distracted by the dazzling pulchritude. The midnite show, generally with a $2.00 minimum, is always crowded. Even though you've made reservations, you must still arrive at least a half hour before show time to claim your table, or it will go to someone else.

There's always a fine array of talent on hand. Guy Lombardo is scheduled for the Desert Inn, Vic Damone at The Sands, and that wonderful Broadway musical "Guys and Dolls" with its original New York Cast will undoubtedly still be packing them in at the Royal Nevada. Complete advance bookings are not available at this writing but convention week is sure to be loaded with spectacular names on the night-club circuit.

Sooner or later the gambling bug will probably bite you and you'll just have to try your luck in the casinos. There are many games to choose from—twenty-one, roulette, dice, race horse betting, bingo, keno, one-armed bandits (slot machines), to mention only a few. Don't forget famous downtown Fremont Street . . . known also by such aliases as "Glitter Gulch," "Gay White Way of the West," and "The World's Largest Gambling Center."

Some words of warning before you lose your shirt!

First, get a strong grip on yourself. Defeat the inner voice that says you can become a millionaire overnight. Bigger purses than yours have bucked the House and found the scales too heavily weighted against them. You can't beat the odds decisively, but you might, just *might*, take away a small profit to brag about.

Second, decide the maximum you will lose and stick to it. If you violate this rule, nothing can help except Fort Knox. It's better to allocate a certain amount for each day's playing so you won't lose it all in the first session.

When you're ready to play, watch the game for a while. Games run hot and cold—that is, for stretches the House will win or lose fairly steadily (naturally winning more than they lose). Try to sit in on a game with a "cold" dealer or croupier; when he turns "hot," go to another table.

Your wins and losses will follow unpredictable cycles. Do not double when you lose—double when you win. Your possibility of winning twice in a row is greater than winning after a loss.

Set a maximum you will lose on each table. When you lose it, go to another table. If you get ahead, put aside some pre-decided portion of your winning, and if you get down to that, quit the table and go to another. This process will limit your loss at each table and if you hit a lucky streak will let you get away from the table ahead of the game. (Maybe, perhaps, could be, could be not.)

Above all else, if you catch yourself making a bet and thinking of the things you could buy with the amount of the bet QUIT! Never let the amount you are betting become large enough to be important to you. Nothing or no one can give you a system for winning, but if you follow these simple rules, you can control your

losses and enjoy your visit.

So you can understand some of the jargon of those crowding around the dice tables, here are some of the terms you're likely to overhear.

*Cinch:* Gambling as viewed by the owner of any gambling device.

*Con:* To persuade forcibly and against good judgment.

*Tout:* Noun—Person who gives gambling advice in return for money or bet placed in his name. Verb—(to tout) To persuade by questionable but exciting logic.

*Shill:* Employee of the House who poses as a customer to keep table from emptying.

*Jazzy Chass:* A term of contempt describing a winner who is trying to get rich. Recognizable by a glazed look in the eyes and typified by heavy and ostentatious betting and/or spending.

*Pigeon:* A term of contempt used to describe a loser who is trying to get even by increasing his bets. (Example —Starting with a $25 bet and doubling to get even. Six losses will put you $1,575 in the hole; ten losses, $25,575.)

*Pit Boss:* Foreman of dealers; can be observed lurking in the background, smiling.

For the outdoor enthusiast—there are two fine 18-hole golf courses; plenty of wonderful Olympic size swimming pools; tennis courts; or perhaps you'd prefer a horseback ride across the picturesque desert. At nearby Lake Mead, largest man-made lake in the world, all kinds of boats can be rented, water skiing is a favorite sport, and the fish run abundantly. Bass, bluegill, crappie, and catfish are to be found in the lake, while the beautiful Colorado River below the Hoover (Boulder) Dam yields hard fighting trout.

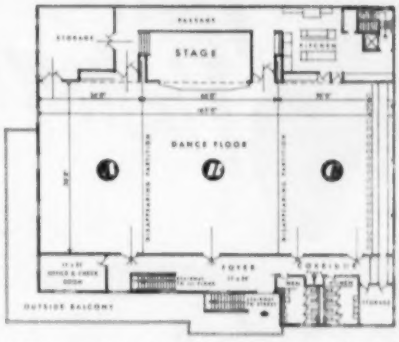
For those with a car, Mt. Charleston 35 miles away is a favorite attraction, or a visit to the Valley of Fire near Overton. With more time, famed Death Valley can be reached via Highway 95, or Grand Canyon, Zion National Park, and Bryce National Park are within an extra day's travel. You might want to plot your homeward course over one of these scenic routes.

Of course, the AMC has planned several fine side trips. Air-conditioned buses will provide comfortable transportation to Molybdenum Corporation of America's operations at Mountain Pass, California, for an inspection of this famous rare earth deposit. Or perhaps you'd rather visit the two chemical plants at Henderson, and the nearby operations of Manganese Inc.

Continued on page 104

# Convention Calendar

Most of the AMC technical sessions will be held in the ballrooms above the Silver Slipper Gambling Hall in the Last Frontier Village. Floor plan at right shows location of meeting rooms and other facilities. Picture at bottom of this page shows the outside of the Slipper which was modeled after the famous Barbary Coast saloons of the early West. Ole-time melodramas are presented in gas light theater on first floor, also to be a convention meeting room. Barbecue party will be held in the Village street. Below is a condensed program of Convention events.




SECOND FLOOR PLAN—SILVER SLIPPER BALLROOM

## MONDAY, OCTOBER 10

10:00 A.M. National Policies and the Mining Industry—Silver Slipper Ballroom
12:15 P.M. Welcoming Luncheon—New Frontier Hotel
2:00 P.M. Labor and Management Problems; Public Relations—Ramona Room, New Frontier
2:00 P.M. Milling and Metallurgy—Ballroom "A" Silver Slipper
2:00 P.M. Exploration and Geology—Ballroom "B" Silver Slipper
5:30 P.M. Barbecue and Western Party—Last Frontier Village

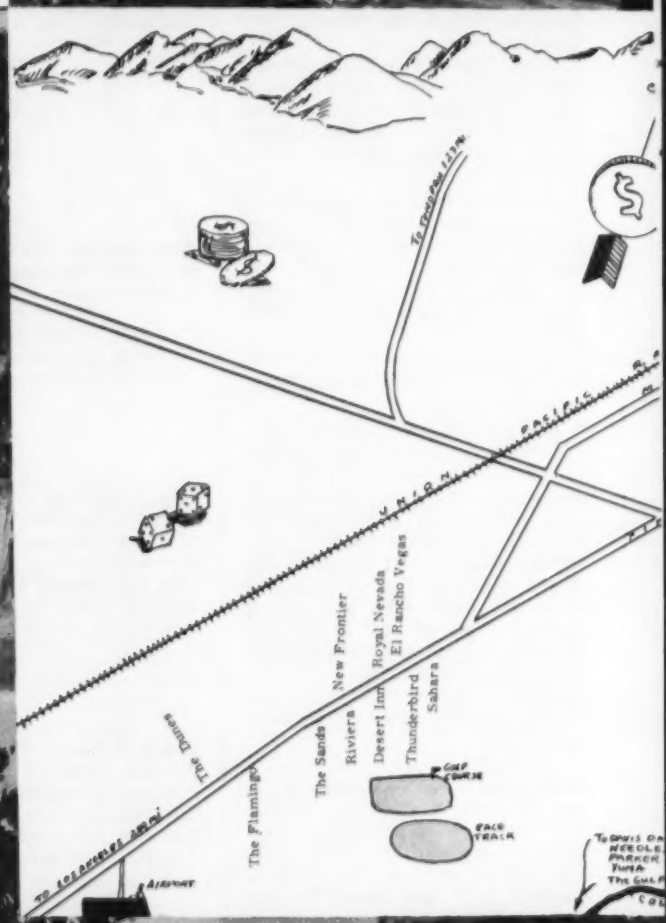
## TUESDAY, OCTOBER 11

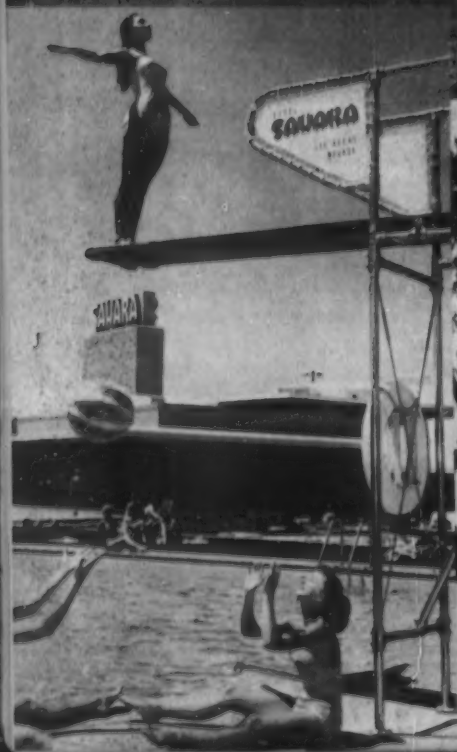
9:45 A.M. Public Lands Panel—Ramona Room
9:45 A.M. Drilling; Roof Support—Ballroom "A"
9:45 A.M. Uranium Milling—Ballroom "B"
12:15 P.M. Strategic Minerals Luncheon—New Frontier
2:00 P.M. Outlook for the Mineral Industries—Ramona Room
2:00 P.M. Improved Mining Methods and Equipment—Ballroom "A"
2:00 P.M. Uranium Exploration and Development—Ballroom "B"

## WEDNESDAY, OCTOBER 12

9:45 A.M. Tariffs; Taxation—Painted Desert Room, Desert Inn
9:45 A.M. Open-Pit Mining—Ballroom "A"
9:45 A.M. Uranium Mining—Ballroom "B"
2:00 P.M. Stockpiling—Government Mineral Programs—Ballroom "A"
2:00 P.M. AEC Policies: Outlook for Industry—Ballroom "B"
2:00 P.M. Industrial Minerals—Theater, Silver Slipper
2:00 P.M. Gold and Silver Conference—Gay 90's Ballroom

Howdy
Podner!


To Boulder City
Pacific
Union
The Sands
New Frontier
Riviera
Royal Nevada
Desert Inn
El Rancho Vegas
Thunderbird
Sahara
The Flamingo
Golf Course
Race Track
Airport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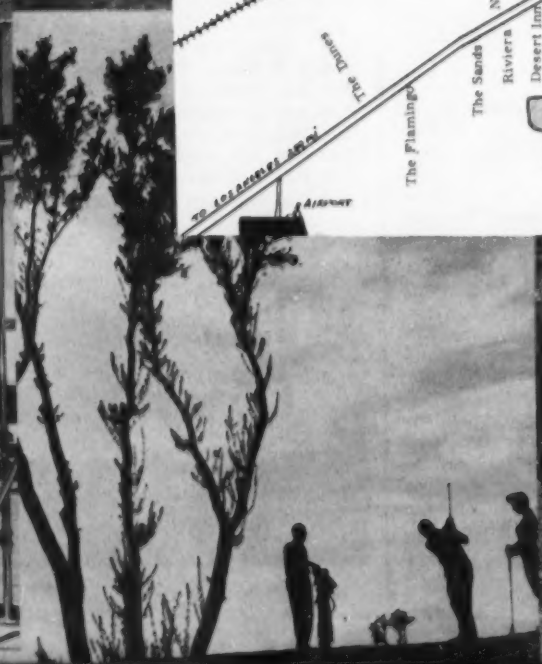

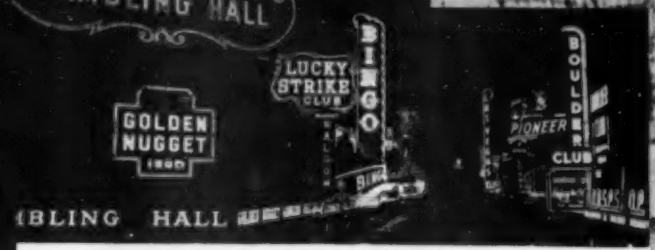

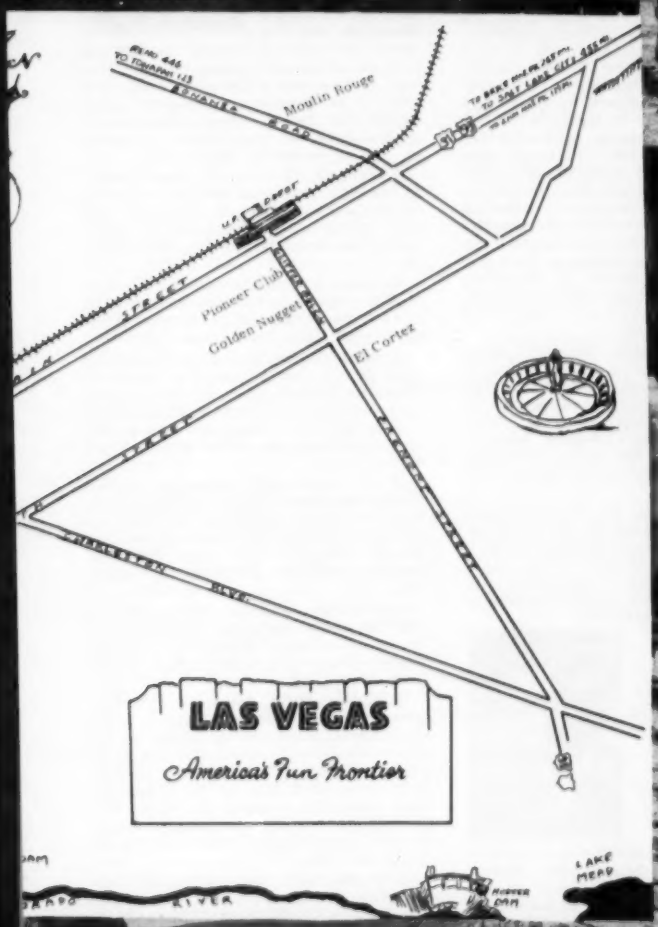

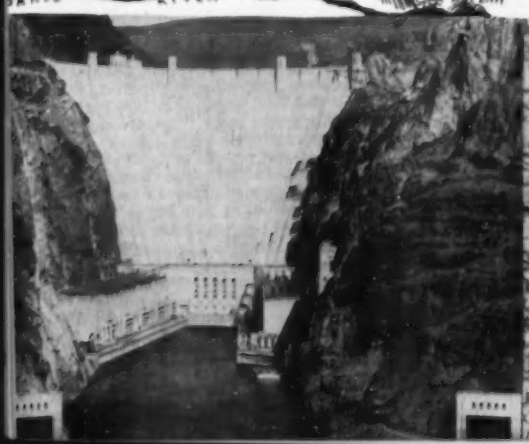

Las Vegas sprawls out across the desert in glamorous fashion . . . from its Fremont Street gambling halls to its huge glistening swimming pools—from its chorus lines to its golf courses, there's fun for all. Try horseback riding or fishing. Visit Hoover Dam—Old hermits from the hills or modern prospectors like Marie Wilson with Geiger counter find plenty to do.

## United States

# Personalities in the News

**JOHN F. MYERS, engineer and metallurgist, is now a consultant for the Denver Equipment Company, Denver, Colorado. A pioneer in the use of the flotation process, Mr. Myers formerly was superintendent of concentration for Tennessee Copper Company. Denver equipment manufactures flotation machines used in concentrating minerals and maintains an ore testing service in Denver for mines throughout the world. He holds the achievement medal of the Colorado School of Mines and the Richards award of the American Institute of Mining for work in beneficiation of minerals.**

**Boyd Guthrie**, supervisor of the U.S. Bureau of Mines oil shale experiment station at Rifle, Colorado, since 1944, has been transferred to the Bureau's station at Laramie, Wyoming. Ten petroleum technicians are also being sent to Laramie from Rifle as a result of the closing down of oil shale retorting operations at the Colorado station.

**M. E. Volin**, former assistant to the chief mining engineer of the Salt Lake City, Utah, experiment station, U.S. Bureau of Mines, has been named director of the Bureau of Mineral Research of the Michigan College of Mining and Technology. Prior to accepting the Michigan post the engineer had been acting as head of the Bureau's base metals division in Washington, D.C.

**J. C. Kieffer**, Wallace, Idaho, has succeeded **J. E. Berg** as general manager of the American Smelting & Refining Company's northwest operations. Mr. Kieffer has been assistant general manager, and succeeding him in that post is **Sergei E. Zelenkov**, former manager of Northern Peru Mining and Smelting Company, AS&R subsidiary.

**Charles Will Wright**, consulting engineer, who spent April reporting on the sulphur mines in Sicily and was to return in May with Joseph W. Frazer, is now recuperating at home in Washington, D.C., after a severe automobile accident several months ago.

**Anthony M. Mastrovich**, Climax Uranium Company, has been named assistant manager of the Grand Junction, Colorado firm. He has been chief of the exploration division for the past three years. Other changes at Climax include: **Louis J. Brew** to manager of mines, **Robert J. Wright** to supervisor of exploration and engineering, **Woodrow Knott** to manager of the mill, and **J. M. Noy** to plant metallurgist.

**John P. Lally**, senior vice president, has been named president of Copper Range Company, Boston, Massachusetts, and its subsidiary White Pine Copper Company. He succeeds the late **Morris F. LaCroix**. Named to the Copper Range board was **George Olmstead, Jr.**, president of S. D. Warren Company.

**Harold Gardner**, formerly with International Minerals and Chemical Corporation, is now connected with the Kerr McGee Oil Industries, Inc.—National Farmers Union potash development project in New Mexico. Farmers Chemical Resources Development Corporation was formed to develop 13,000 acres of potash land in Eddy and Lea counties.

Uranium Reduction Company, Salt Lake City, Utah has announced the appointment of the following officials: **J. W. Burgess**, formerly with American Zinc Company of Illinois, Dumas, Texas, who is in charge of mill construction; **Sid Worthen**, project engineer; **Roy Hollis**, formerly with National Lead Company in connection with their AEC pilot plant project, who will be mill general manager; **E. H. Snyder, Jr.**, who has been making an intensive study of uranium metallurgy at Combined Metals Reduction Company and was named process engineer; **Dan Stewart**, formerly American Zinc, Lead & Smelting Company's district geologist at Joplin, Missouri, who is chief geologist; **Clem Chase**, metallurgist.

**Walter M. Fenton**, formerly sales manager, has been named director of a newly formed department of product research and development, according to the Lithium Corporation of America, Inc. **J. Douglas Campbell**, head of the firm's New York sales office, has been appointed director of sales to succeed Mr. Fenton.

**Joseph W. Berg, Jr.**, has accepted the position of assistant professor in the department of geophysics, University of Utah, Salt Lake City, Utah. Dr. Berg was formerly assistant professor of geophysics at the University of Tulsa, Tulsa, Oklahoma.

**California Governor GOODWIN J. KNIGHT (left) is honorary chairman and keynote speaker at the Western Governors Mineral Policies Conference to be held in Sacramento, California November 7 and 8. DEWITT NELSON, director of the Department of Natural Resources for the State of California, is co-chairman of the conference which has been called to formulate and recommend national mineral policies of concern to the western states. Delegates are expected from the eleven western states, South Dakota, and Alaska. The Western Governors Mining Advisory Council, established several years ago, is the nucleus for the conference, and chairman S. H. WILLISTON is serving with Mr. Nelson as co-chairman. United States Senator THOMAS H. KUCHEL of California has been named as one of the principal speakers at the two-day meeting and is expected to discuss the recent military withdrawals of western wildlands which have closed down production in many mineral-producing areas.**

**PAUL W. ALLEN, who resigned in July as plant manager of National Lead Company's Macintyre Development in New York, has joined the staff of Cyprus Mines Corporation in Los Angeles, California. Mr. Allen is responsible for the Copper Queen and Old Dick Mines near Bagdad, Arizona. He has also been elected vice president and general manager of Pima Mining Company, which owns and will be developing a low-grade copper deposit near Tucson, Arizona. (See page 73 of this issue for latest details on Pima's expansion plans.)**

**Charles E. Horning**, Wallace, Idaho, is the new president of Lucky Friday Silver-Lead Mines. A director and vice president of the firm for many years, he succeeds the late **John Sekulic**.

**Kenneth L. Cook** has been promoted to the rank of full professor and head of the department of geophysics, University of Utah, Salt Lake City.

**Murray Godbe** is now employed by Hail Mines, Inc.'s geological staff at Hilsboro, New Mexico. He came to the company from the United States Steel Corporation for whom he was a raw materials engineer at the Provo, Utah office.

**W. L. Davenport**, manager of the Wellington mine, Breckenridge, Colorado, has retired and turned operation of the mine over to Harold Horn and Marvin Burger, who have acted as partners with Mr. Davenport for some time.

**Fred L. Shanklin** has been appointed vice president and general manager of the ore division of Union Carbide and Carbon Corporation. His offices are in New York City.

**C. LeRoy Hoyt**, formerly chief engineer for Ray Mines division, was named administrative assistant to the general manager of the division, Kennecott Copper Corporation officials have announced. **Harold W. Bishop** has been named to succeed Mr. Hoyt. Mr. Bishop previously was with Consolidated Copper Mines Corporation, Kimberly, Nevada.

**John Gierhart**, Raw Materials Survey, Inc. Portland, Oregon, has joined the faculty of Eastern Illinois State College. He will be on the staff of the geography department at the college.

**Roy MacLean**, manufacturing process engineer at American Potash and Chemical Corporation's main plant at Trona, California, was recently appointed general foreman in charge of production at the new American Lithium Chemicals, Inc. plant at San Antonio, Texas. American Potash owns a controlling interest in the Texas firm.

**Ernest Brunel**, special project engineer, is now working for United States Potash Company, Carlsbad, New Mexico. Previously, he was connected with American Smelting and Refining Company and the Southwest Potash Corporation.

# Newsmakers in International Mining

**Jan H. Marsman,** president of Marsman & Company, Philippine mining firm, and his wife, **Mrs. Mary Marsman,** president of the newly formed Palawan Consolidated Mining Company, are on an extended business trip to the United States and Europe. They are visiting machinery and mining firms doing business with Marsman & Company and are also exploring markets for mercury which is being produced by Palawan Quicksilver Mines, near Puerto Princesa, Palawan province, Philippines.

**H. F. Melouney** has been named manager of Territory Enterprises Pty. Ltd., Northern Territory, Australia. The company, a subsidiary of Zinc Corporation, is agent for the Australian government in the Rum Jungle uranium area. **S. Christie,** former manager of Territory Enterprises, has been named assistant general manager (production) for both Zinc Corporation and New Broken Hill Consolidated Ltd., Broken Hill, New South Wales.

**E. M. Lindenau** is resident manager of Compania Minero Choco Pacifico, Columbia. The firm is one of the country's largest dredging companies.

**David Steele,** American Metal Company, Ltd., New York City, has been one of the company's officials negotiating in the Philippine Islands for purchase of copper ore from the Toledo mine of Atlas Consolidated Mining and Development Company. Mr. Steele flew to the Islands to resume talks which he had previously initiated with **Col. Andres Soriano,** Atlas president, who was in New York this summer.

**Habibut Rabibur,** Pakistan's High Commissioner in Australia, has completed a tour of that country's uranium areas. He inspected uranium mining operations and treatment plants and several gold mining operations in Northern and Central Australia.

**L. A. Crozier,** formerly general manager of Raub Australian Gold Mines, Pahang, Malaya, has been appointed general manager of the Mawchi Mines Ltd. in Burma.

**D. T. Waring,** president of the Federated Malayan States Chamber of Mines, and **J. T. Chappel,** vice president, have been elected to represent the group in the Federal Legislative Council, it has been announced from Kuala Lumpur, Malaya.

**Merle H. Guise,** United States consulting engineer, is now inspecting mining operations in Africa as part of a world tour which has taken him to various parts of Oceania, Asia, and Europe.

**A. R. West,** general manager and director of North Broken Hill Ltd., Broken Hill, New South Wales, Australia, has been elected president of the Austral-Asian Institute of Mining and Metallurgy for 1956.

**Abdus Satter,** student at the Engineering College, Dacca, Pakistan, has been selected by the Colorado School of Mines, Golden, Colorado, to receive a scholarship at the school for the 1955-56 session. Mr. Sattar will concentrate his studies on petroleum engineering.

**Maurice Mawby** is now vice chairman of the board, Consolidated Zinc Pty. Ltd., New South Wales, Australia.

**G. Gregory Bryan,** mining engineer, is now located at Hempstead, Long Island, New York. Formerly, he maintained headquarters in San Jose, Costa Rica.

**Russell Bryan,** consulting engineer, left the first part of September for the Dominican Republic to engage in iron mine examination. He is a consultant on iron ore mines under development by an eastern steel concern.

**P. Hansen,** director of the Krupp organization in Germany, recently was in Pakistan. While at Karachi he conferred with **Shujauddin Ahmed** of the Pakistan Industrial Development Corporation, for whom Krupp is acting as consulting engineer.

**Corbin Allardice** has been appointed to the newly created position of Atomic Energy Advisor to the World Bank.

**Takao Sakamoto,** professor of geology at the University of Tokyo, Japan, is engaged in a technical assistance mission for the United Nations Educational, Scientific and Cultural Organization in Brazil. On leave of absence from his post in Tokyo, Professor Sakamoto will work on a survey of mineral resources in the Amazon Valley. He will join **Calamur Mahadevan,** Indian geologist, in this work. Professor Mahadevan has been working on development of the Amazon region since last June.

**Jules Lacrosse,** general manager of the mines division, and **Jean Gonze,** general superintendent of the Prince Leopold mines, Union Miniere du Haut Katanga, Belgian Congo mineral producer, have been touring the United States this summer. Union Miniere is planning an additional underground operation and the two officials have been studying mechanical equipment used in similar operations in the United States. They have been accompanied on their inspection trips by **M. Dupont,** of Indusa Export Company, Inc., United States affiliate of Union Miniere.

**Brij Rai Sharan,** mining engineer from India and graduate of the South Dakota School of Mines, has entered employment with the Bald Mountain Mining Company, Trojan, South Dakota.

**Carlos Tapia,** superintendent of the Carahuacra mine, Volcan Mines Company, Lima, Peru, has been studying mining and milling operations in the United States. The Volcan operations are both surface and underground, and the chief mineral produced is zinc.

**William Johnston,** chief of the foreign division, U.S. Geological Service, has been on a tour of inspection of the various geological missions now operating in Mexico, Cuba, Brazil, Bolivia, Chile and Peru.

**H. Danforth Starr,** vice president and treasurer of Cerro de Pasco Corporation, arrived in Peru from the United States late this past summer.

**GERALD A. MUNSON, chief mineral engineer of Lithium Corporation of America, Inc., is now supervising the company's mining interests in the United States and Canada. He has been transferred from the Hill City, South Dakota operations to new headquarters in Minneapolis, Minnesota. Mr. Munson designed and managed the mill at Hill City and was general manager of the Bessemer City program last year. Prior to joining the staff in 1951, he was a consultant for the corporation.**

**W. E. Gooday,** formerly with New Consolidated Gold Fields, Ltd., has accepted a position with the Transvaal and Orange Free State Chamber of Mines. He is serving as secretary of the European section, Directorate of Recruiting. Headquarters are in London, England.

**M. H. Forrest,** assistant consulting engineer for the Free State mines of the Anglo American group, has been appointed consulting engineer to the group's copper mines in Northern Rhodesia. He has recently been on a study tour of the United States.

**Alfonso S. Ybanez,** formerly of Benguet Consolidated Mining Company, is the new general superintendent at Elizalde & Company, Inc.'s Masara project.

**Eugene Charles Larrabure,** mining engineer, has been named factory representative for Thor Power Tool Company in western South America. He will maintain headquarters in Lima, Peru. Mr. Larrabure was formerly with the Northern Peru Mining and Smelting Company and the Cerro de Pasco Corporation. He has also worked as a sales engineer for Nordberg Manufacturing Company.

**F. Willfort,** manager of Cailloma Mines, Lima, Peru, made a recent trip to Frankfurt, Germany.

**J. Fred Williams, Jr.,** associate professor of metallurgy, Washington State College, has been named general manager for Tungsten Uranium Mines, Spokane, Washington. Professor Williams was in the Philippine Islands in 1953 and 1954 helping to establish a school of mines for the Philippine government. He is considered an authority on the ore milling process.

**Frank Eichelberger,** Spokane, Washington mining engineer, has completed a tour of tungsten and other metal mines in Spain, Portugal, Turkey and other European countries.

**Clarence A. Weekley,** assistant manager of the mining department, A. Soriano y Cia, has been visiting in the United States.

**V. J. White,** field manager for Northern Greece Goldfields, Ltd., Kilkis, Greece, has been visiting the United States.

## Akita Zinc

Continued from page 59

cadmium, 40.3 percent zinc, and 1.0 percent copper is further processed to recover electrolytic cadmium of 99.97 percent purity. Nylon cloth used for the filter presses has an average life of six months.

### Electrolysis

In the tank house 144 cells are all on the same level and arranged in 8 rows of 18 cells each. Every two rows have a main feed pipe and a discharge launder in common. All cells are in series electrically. An ignitron mercury rectifier of 4,240 kva supplies 8,000 amperes at 530 volts.

Each cell has 14 anodes and 13 cathodes. The anode is of silver-lead alloy containing 10 percent silver and is 555 by 988 by 7 millimeters thick. The cathode sheet is 99.8 percent aluminum and is 600 by 968 by 5 millimeters thick with an immersion area of 1.12 square meters. The cathode sheet is welded to a header bar by argon-welding. The spacing between the centers of the anodes is 75 millimeters.

The cell is constructed of ferro-concrete and lined with lead and acid proof brick. The interior dimension is 1,050 by 660 by 1,300 millimeters in depth. The outer surface is coated with synthetic resin paint.

Each cell receives from the main feed pipe 18 liters a minute of circulating solution. The electrolyte in the cells is maintained steadily at 42 grams of zinc and 100 grams of acid per liter. As an addition agent 450 grams of glue are added per metric ton of cathode. For the purpose of mist prevention, oil-free soya bean powder is effectively used. The cell temperature of 38°C is maintained by circulating the electrolyte through a flash evaporation cooler with a capacity of 1,470,000 Kcal. per hour. Gypsum depositing in the cooler and the cold solution pipes is a problem and must be removed once or twice a month. The trouble is not yet solved.

The current density is 450 amperes per square meter of cathode surface. Every 40 hours the cathodes are pulled out and carried by an electrical traveling hoist, washed by dipping them into a washing tank, and then hung on a stripping rack. Four or five cathodes, one third of each cell, are taken out at a time and replaced by clean cathodes. However, any adverse effect is not actually observed. A.C. power consumption is 3,400 kwh per metric ton of cathode with a current efficiency of 93.8 percent.

### Melting and Casting

The cathodes are melted in an oil-fired reverberatory furnace, 4.5 by 2.2 meters. About 30 metric tons of the molten zinc are held in the bath. Slab molds are arranged in two rows of 25 molds each. An electrically driven hoist carries a ladle containing 600 kilograms of molten zinc. Furnace drosses are treated by an impact breaker and then separated by a low head screen into metal particles and oxide powder. Both are further processed to obtain zinc dust for use in the purification plant. There are three mold men and one furnace man on one shift.

### Purity of Product

Special care is taken to produce a high quality zinc. Because of iron, copper, and cadmium impurities, the solution should be completely purified. The last trace of iron is removed more effectively by adding potassium permanganate than by adding manganese dioxide ore. The cadmium concentration in the solution is at times changeable depending on the concentrate. Quick analysis by the Polarograph is helpful in measuring it and checking blue powder supply. To reduce lead in the cathode deposit, the cell condition should be maintained constantly, particularly with regard to the electrolyte components. The cell cleaning is done every two months.

### Measuring and Controlling System

Because the entire process is operated continuously, or semi-continuously in part, with no large reservoir for emergency storage provided in any stage, each roasting, leaching, purification, and electrolysis plant has its central control system. Most of the pertinent data are recorded on 24 hours charts. While the operation of the reactor and the Peabody gas scrubber are automatically controlled at definite temperatures, the feed of concentrate and air into the reactor, the calcine feed into the leaching tank, the flows of solutions, the densities of pulps and solutions, reagent additions, and the electric current are controlled by hand in accordance with gauge and panel readings.

Three kinds of water are supplied at the plant: filtered for miscellaneous purposes; softened for boiler feed; and dechlorinated for the process water. These are prepared by a green sand filter and two ion exchange resin filters. The entire purification system is completely automatic.

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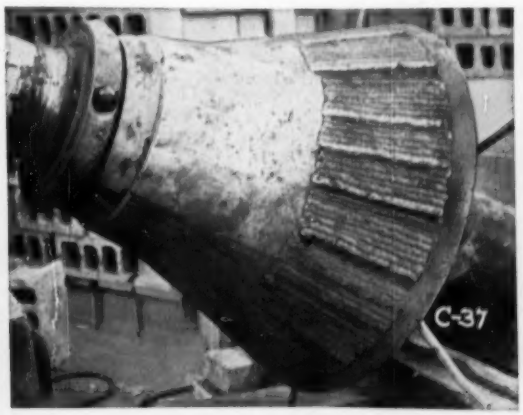



## Before and After Applying MANGA-TONE N.M. and RESISTO-LOY

This rebuilding job on Gyratory Liners was accomplished economically despite the fact that well over an inch of deposited metal was required all around the bottom third. Note the very badly worn areas in the "before" picture. Then note the perfectly done, finished job.

This rebuilding was done by the plant maintenance welder, using our Manga-tone N.M. to rebuild the liner and making the last pass over the lower 15 inches with Resisto-Loy. This final coating pays a fine dividend in additional wear resistance.

Why not put in a call for our field man? He can show you many ways to save materials and money.

## THE RESISTO-LOY CO., INC. - Grand Rapids 7, Michigan

### Highland Plant

Continued from page 55

own record by supplying three, 20-inch, rubber-lined pumps. Two of these pumps are used for the rougher feed, and the third for tailing disposal. Each feed pump is powered by a 350-horsepower A-C motor. The tail pump has a 450-horsepower motor.

### Three Stage Concentration

The sands are concentrated at the wet mill in three stages—roughing, cleaning, and finishing. At the top of the wet mill there are 32 rougher feed divider heads, 16 for each of the two circuits. The dividers consist of a circular tank with 30 outlets, each feeding one Humphreys rougher spiral through a 2½-inch hose. Altogether there are 960 rougher feed spirals for both circuits.

Each of the 5-turn rougher spirals has three concentrate and two middling cutters. Tailing from the rougher spirals go to the tailing sump. Middling product is returned to the rougher circuit, and the concentrate is advanced to the cleaner feed bin.

The cleaner feed pumps (Allen-Sherman-Hoff, 12-inch rubber-lined pumps) return the pulp to the top of the mill to 20-way cleaner feed divider heads.

The second stage of concentration consists of the cleaner spirals. These 5-turn spirals also cut two products. The middling product is kept in closed circuit and the concentrate advanced. Tailing is returned to the rougher circuit. In the two parallel circuits there are 16 cleaner feed dividers and 320 cleaner spirals.

The third stage of spiral concentration is affected by 3-turn finisher spirals. Each of these 160 spirals has five manually controlled concentrate cutters. (Cutters on all the other spirals are fixed.)

Clear water is used for wash water in the finisher spirals, whereas pond water, which is highly discolored by suspended organic material, is used for make-up and wash water in the other two spiral stages. Clear water is necessary in the final concentration stage to enable the operator to visually observe the concentration along the inner edge of the spiral trough and to adjust the cutters.

Tailing from the finisher spirals is recirculated to the cleaner spirals and the concentrate goes to the finished bin and pump.

Tailing from the wet mill is pumped to the disposal area through a 24-inch pipe line. At the pipe discharge, A Link-Belt dragline and an Allis-Chalmers HD 15 tractor stack the sands for backfilling.

The water from the tailing goes to a series of settling ponds formed by levees. Future plans call for the construction of a water treatment plant to remove the suspended organic material in the water before it will be released to public streams.

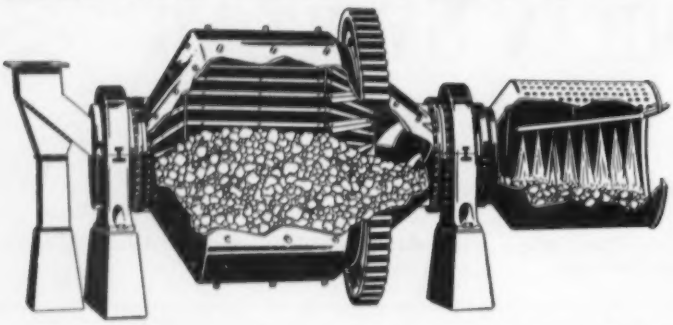
Concentrate is pumped from the wet mill at the rate of 45 tons-per-hour with 500 gallons of water-per-minute through a 4-inch pipe line to the dry mill. Two A-C, 5- by 4-inch, rubber-lined pumps, connected in series, initiate the concentrate flow. Five booster stations, with the same type and size pumps, are spaced about 1,600 feet apart between the two mills.

The dry mill is the final step in the recovery of ilmenite and associated minerals. Separation of minerals is by high tension and magnetic separators.

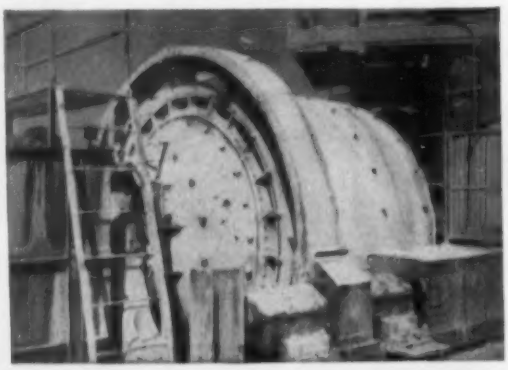
The Highland plant is designed to produce 100,000 tons of titanium mineral concentrate yearly. It is all used by du Pont for the manufacture of titanium dioxide pigment and titanium metal.

E. C. Weichel is manager of both the Highland and Trail Ridge plants. E. S. Beebe is Highland plant superintendent, and L. W. Mathews is Highland production manager.


**HARDINGE SCRUBBERS FOR PIT-RUN MATERIALS**



Large diameter, short length trunnions permit chute feeding of unsized ore and rock at rates up to 600 tons per hour.
The mass loading and ball-mill action in the scrubber quickly and completely slurries the clay and dirt, permitting ready separation on washing screens or trommels.



View of a 10′ x 66″ Hardinge Scrubber cleaning crushed dolomite in a California plant.

Bulletin 37-A-3

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## Port Pirie Plant Opens; Seek Additional Deposits

The new Port Pirie uranium treatment plant in South Australia is now operating at near-capacity level. The plant is believed to be the first large-scale operation in the world to treat a highly refractory uranium ore. The process involves use of hot concentrated sulphuric acid to free the uranium from the complex mineral occurring at Radium Hill. With the announcement that the plant can handle much more ore than can be supplied by the Radium Hill uranium mines, the South Australian government is conducting investigations for new deposits.

A recent report states that the government is interested in the establishment by private mining companies of a mine in the Mount Victoria Hut District, 60 miles northwest of Radium Hill. A large orebody has been delineated there by the Mines Department, and additional quantities of high-grade ore are believed available in the area. A bill is now being prepared to facilitate establishment of a mine by private enterprise, and geophysical information from the government investigations will be made available to reputable mining companies. Port Pirie's plant will treat concentrates from the area.

The Minister for Mines in Australia has hinted that a metal plant to produce material for commercial power reactors might be the next step in South Australia's growing uranium industry.

## Rich Copper Find in Chile Reported by Anaconda Co.

The Anaconda Company has reported discovery of a new property in Chile, the Indio Muerto mine, that promises to rank among the great copper mines of the world. It is located approximately 20 miles northeast of Anaconda's Potrerillos mine and is at an elevation of 10,000 feet. An intensive diamond drilling program is being conducted to determine deposits of the mine, but enough ore has already been blocked out to warrant operations within a short time, company officials said. Mining is expected to be done by block-caving methods similar to those used at nearby Potrerillos, where the ore will probably be treated.

Anaconda is also planning to increase output at its biggest copper producer, Chuquicamata, which now produces 264,000 tons annually. A small mine 12 miles from Santiago, Chile, the Africana, is also being developed by the firm.

## Stripping, Plant Design Underway at Pima Mine

The Pima Mining Company, now jointly owned by Cyprus Mines Corporation, Union Oil Company of California, and the Utah Construction Company, has engaged Utah Construction to start the removal of overburden from its low-grade copper deposit in the Twin Buttes mining district of Arizona. This will require digging through about 200 feet of alluvium and removing several million cubic yards of material from the Pima property to reach the underlying ore. Actual production of ore and copper concentrates is expected early in 1957, with concentrates to be shipped to a smelter.

Concurrent with stripping operations, the design and construction of plant facilities to treat at least 2,000 tons per day of ore will be carried on. This work will be performed by Utah Construction as prime contractor. While the metallurgy of the ore is not completely worked out yet, the general flowsheet has been decided and the mill will be flotation.

Additional surface drilling which was carried on in conjunction with underground exploration, disclosed the presence of a halo of low-grade copper ore around the preliminary discovery. The depth to bedrock in the vicinity of the area to be open pitted averages 200 feet of barren alluvium. The sulphide ore occurs at roughly 300 feet below the surface. It is overlain with an approximately 50-foot-thick zone of oxidized copper ore. Above this and extending to the top of the bedrock is a 50-foot-thick zone of barren leached rock.

Drexel Spaulding, who served as resident manager during the exploration and development phases, will continue in that capacity. Paul W. Allen, formerly plant manager of National Lead Company's MacIntyre Development in New York, has been elected vice president and general manager of Pima. He also has joined the staff of Cyprus Mines, and will be responsible for that company's operations at the Copper Queen and Old Dick mines near Bagdad, Arizona.

## U.S. Firm To Develop Bolivian Gold Properties

The Bolivian government has authorized the United States firm, Southern Heater Corporation, to develop gold deposits in the Alto Beni region, which includes the Challana, Coroico, and Carlos concessions formerly held by Aramayo Mines before the nationalization. A Bolivian firm will be organized with U.S. capital of $7,000,000, and a guarantee of $1,000,000 must be made within 180 days after signature of the contract.

The company will rent the 15,000 hectares for 25 years, and will have a preferential option for another 10,000 hectares. It will pay 10 percent royalties to the state on gross gold ingot production, plus five percent dividends. In turn, it will be given facilities to build roads and airfields for direct access to the concessions.

The company will be able to exchange the gold extracted through a special account with the Banco Minero. At the government's request, the company will sell gold for the dollars and sterling available. This latter move is expected to strengthen the Bolivian economy.

## Production Underway At New British $H_2SO_4$ Plant

Production has started at the sulphuric acid plant of Solway Chemicals Ltd., Marchon Products subsidiary, at Whitehaven in Cumberland, England. Originally planned as a £2,000,000 project, the plant and mine have cost nearly £3,000,000 and full-capacity production is expected to reach 100,000 tons of high-grade sulphuric acid a year, instead of the 75,000 tons planned. Yearly output of the mine will be 350,000 tons.

The acid is being manufactured from anhydrite deposits which lay under the St. Bees Headland adjacent to the site. Borings have shown that reserves exist to cover the plant's requirements for at least 50 years. Cement is being produced as a by-product of the process, and a potential annual output of 100,000 tons of finished cement has been estimated.

## *Pronto Uranium Mines Goes Into Production*

**Canada's first large, privately owned uranium plant has gone into operation. Pictured above is the $7,000,000 project just completed by Pronto Uranium Mines, Ltd. in the Algoma district of Ontario. From left to right are the sulphuric acid and water tanks with the mill proper in the left background. The analytical laboratories are in the right center foreground with the general offices (red brick building) standing directly behind. The headframe dominates the scene, with its hoist house to the left, and fine ore bins, crusher, and grinding section to the far right. The plant opened more than four months ahead of its January 1, 1956 contract date for commencement. Underground development includes a vertical, three-compartment shaft, sunk to a depth of 550 feet and equipped to handle 2,500 tons per day. The five-level Pronto mine will draw ore from its three upper levels only for some time to come. Pronto's contract with Eldorado Mining and Refining Ltd., the government-owned company, calls for sale of $55,000,000 worth of uranium.**

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## Analysis of Marinduque Iron Mines Deposits Hints at New Copper District for Philippines

Marinduque Iron Mines Agents Inc. has a crew diamond drilling its property near Bagacay on the island of Samar, Republic of the Philippines, and results have been extremely encouraging. It appears likely that this may become another important copper district in the islands.

Laboratory equipment is being installed in order to do complete, on-the-spot analytical work; bunk houses are being erected; a radio-phone communication is being installed; and a three-kilometer road to the main highway is being opened up by bulldozer.

Five deposits have been studied containing cupriferous iron ore, pyrite, and secondary copper occurring in igneous rocks or replaced limestones. A preliminary geological report seems to indicate that there is a definite genetic relationship between these several different types.

The main ore body covers parts of Jimmy and Josephine claims. It has been estimated to contain about 688,900 tons of probable ore and 150,000 tons of possible ore. Iron averages about 55 percent, but copper averages about 1.2 percent in preliminary sampling.

The Soriano ore body is in the Lilian claim adjacent and to the north of the camp. A rough estimate of reserves here is 200,000 tons of probable and 200,000 tons of possible ore averaging 57 percent iron and perhaps 1 percent copper.

The Nellie Float Area has an abundance of large iron boulders. Reserve is estimated at 100,000 tons of possible ore of at least 55 percent iron.

The Lower Guila deposits are strung down the creek nearly to the Taft River. Although much of the ore is limonite, hematite is usually present. Indications are that the section contains about 1,000,000 tons probable and 1,000,000 tons possible at a grade of 52.72 percent iron.

The grand total of probable and possible reserves is about 3,338,900 tons averaging about 53.7 percent iron and an undetermined copper content. Value and use of the ore will depend on the copper content.

If the copper content is high enough, the geological report suggests that the ore may possibly be mined for copper with the iron tailings sold to Japan as sinter feed, just as the Philippine Iron Mines is producing sinter feed for Japan.

## New Unit to Direct Union Carbide Atomic Ventures

Union Carbide and Carbon Corporation is consolidating all of its atomic energy activities in a new division, the Union Carbide Nuclear Company. Formation of the new division means that one of the oldest names in the uranium industry, that of United States Vanadium Company, has been relinquished.

Included in the new division, headed by Kenneth Rush, who has been president of USV, are the following Union Carbon and Carbide subsidiaries: U.S. Vanadium, which has mining and milling operations in California, Colorado, Nevada, and Utah; Carbide and Carbon Chemicals Company, which has operated diffusion plants for the U.S. Atomic Energy Commission at Oak Ridge, Tennessee, and Paducah, Kentucky, and the Oak Ridge National Laboratory; National Carbon Company, producer of high-purity graphite for use in atomic reactors; Electro Metallurgical Company, developer of stainless steels and other metals for atomic energy equipment; Bakelite Company, one of the pioneers of the resin-in-pulp uranium processing method; Linde Air Products Company, which has done research on uranium compounds.

Oscar F. Holmgren will assist Mr. Rush as vice president in charge of mining and milling. Other Union Carbide Nuclear Company vice presidents are Lyman A. Bliss and Clark E. Center.

## To Build Iron Ore Loading Conveyor at Chilean Port

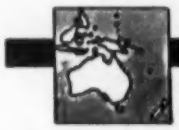
A complete storage and ship loading installation will be built at the Port of Huasco, Chile where iron ore will be transferred by conveyor to ships at the rate of 600 tons an hour. Santa Barbara Mining Company of Chile has awarded the construction contract to Hewitt-Robins, Inc. of Stamford, Connecticut.

The ore will arrive from the mine by rail and will be then discharged to a stacking conveyor designed to form a storage pile of 20,000 tons. Under the storage pile will be a second conveyor that will receive the ore through overhead rolling gates which can be opened and closed to control the rate of flow. From the tunnel conveyor, transfer will be made to a third conveyor which will deliver the ore to cargo vessels.

## Utah Firm Gains Control Of Cb-Ta Property

National Uranium Corporation (Utah) has acquired control of Societe d'Etude et de Recherches Minieres Inine Guyane (SERMIG), a French company in South America, actively involved in the production of columbite-tantalite, gold, and other minerals. Company engineers reportedly have blockd out an estimated 1,700,000 pounds of columbite ore.

National Uranium holds 329 claims on the Colorado Plateau. This present acquisition is intended to diversify the company's position.



## OCEANIA

QUEENSLAND—*Rio Tinto Ltd.* has offered to purchase 500,000 shares in *Australasian Oil Exploration Ltd.* at a premium which will vary depending upon the date on which the shares are acquired. Rio Tinto's drilling program at the *Mary Kathleen* uranium deposit, Mount Isa, has already gone half way toward proving sufficient ore tonnage to warrant erection of a treatment plant. Further proving is expected to take another six months. Development up to production stage, if justified, will cost £6,000,000, and a long-term contract for the sale of uranium oxide will be necessary first. Mary Kathleen ore is complex but it is anticipated that a satisfactory treatment process will be developed.

### *Philippine Mining Firm Supplies Its Own Timber*

**The Bobok saw mill of the Benguet Consolidated Mining Company is pictured above. This mill supplies all mine timber—from wedges to shaft sets—to both the Benguet and Balatoc mining companies' underground mines at Baguio, Mountain Province, Philippine Islands. This mill saws an average of 23,000,000 board feet of timber annually. Kenneth F. Jorgensen, superintendent of logging and saw milling, is proud of Benguet's timber operations: first, because mine timber costs the company only one-half as much as if the company purchased it on the open market. Average cost per thousand for the pine (closely resembling southern Yellow Long Leaf) is $50.00 per thousand board feet. Second, he is proud that the only part of the log that is not used is the knots. All timber and lumber is cut according to mine schedules and uses with all s'abs used for mine logging. A very extensive network of aerial trams is used to carry logs from woods to the mill and from mill to the two main mine centers. Benguet's investment in timber and sawmilling is $1,750,000.**

In the largest underground mine in the United States, over 70% of the daily production of 28,000 tons of molybdenum ores—more than half of all the moly this side of the iron curtain—is hauled in Card Granby type cars built to Climax specifications.

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## INTERNATIONAL

NEW SOUTH WALES—*Uranium Corporation of Australia Pty. Ltd.* (wholly owned subsidiary of *Rye Park Scheelite N.L.*) commenced test boring of beach areas at Laurieton in July. A plant on the area is producing 75 tons of rutile weekly and is being increased in capacity. Due to current very high rutile prices, most producers are endeavoring to increase output and many contracts have been made for sales to the end of 1956. The total year's production should exceed the record 1954 production of 44,658 tons.

REPUBLIC OF THE PHILIPPINES—Shipments of chrome ore from the islands totaled 217,597 long tons for the first half of this year, according to the Associated Steamship Lines. This compares with 220,023 long tons in the same period of last year.

SOUTH AUSTRALIA—The largest and most modern sulphuric acid plant in the southern hemisphere has been completed at Port Adelaide. This uses pyritic concentrate from Nairne, near Adelaide, the Nairne deposit being one of the largest in the world. Operating company of the Nairne deposit is *Nairne Pyrites Ltd.*, equipped to treat 365,000 tons of ore yearly—equivalent to 33,000 tons of sulphur. The acid plant at Port Adelaide is owned by *Sulphuric Acid Ltd.* and has a capacity of 100,000 tons of mono acid per year.

REPUBLIC OF THE PHILIPPINES—The dismantling of the milling plant of *Mindanao Mother Lode Mines* in Surigao on Mindanao Island and crating for shipment to the company's new mine in Zambales on Luzon Island is being rushed so that the *Cabapa* (Zambales) property may be brought into production at the earliest date.

NORTHERN TERRITORY—*United Uranium N.L.* considers the *El Sharana* area so encouraging that it may justify erection of a treatment plant for that area alone. An average length of 270 feet by 41 feet has now been proved and at least 250,000 pounds of uranium oxide, worth £1,250,000, have been proved by chemical assaying and radiometric logging. The so-called *Pallette* lode, discovered at the end of July, has disclosed 80 feet of mineralization; the ore is believed to be pitchblende.

REPUBLIC OF THE PHILIPPINES—In the July 1955 issue of MINING WORLD, we published a picture of the new Nordberg Diesel generating unit installed in the *Balatoc* power plant recently. Unfortunately, we underrate the unit; it is a 2,800-horsepower, 1,980-kilowatt engine, not a 1,800-horsepower as stated. *Benguet Consolidated Mining Company* has been so pleased with the performance of this unit that it has ordered a second, rated at 2,650 kilowatts.

INDONESIA—In the East-Monsoon, the inhabitants of Ngabang, Pontianak, West Borneo, are diving for diamonds and gold in the Sungai Landak River. The dry season in the area is from about June to October. The river is then shallow—about 10 to 15 meters deep. Divers are generally organized in groups of four to 20 persons who share the operations. Results are very diverging. Most of the diamonds and gold are bought by Chinese.

WESTERN AUSTRALIA — Diamond drilling of the rich *Hill 50 Mines N.L.* from the 1,060-foot level confirms that the ore body continues on a northerly

pitch to a vertical depth of 1,300 feet. The company continues a monthly output of more than 6,300 ounces of gold from 9,000 tons of ore.

NEW CALEDONIA—The New Caledonia Mining Bureau with nine qualified geologists in its employ, is busy prospecting for cobalt, nickel, and chrome deposits. The Falconbridge Nickel Mines Ltd. of Ontario, Canada, is reported to be interested in the island's cobalt potentials, and has been negotiating with several interests over development of such deposits. About $2,000,000 would be invested, and half of the cobalt would be reserved for French needs. No definite agreements have been reached, however.

REPUBLIC OF THE PHILIPPINES—Judge John W. Haussermann, president and general manager of the *Benquet* and *Balatoc* gold mining firms, reports that Benquet's net profit before reserves in 1954 was $1,781,403, as compared with $1,624,911 in 1953. Balatoc's net profit before reserves was $488,829, compared with $228,157 in the previous year. In 1954 neither company had to use the benefits of the gold subsidy act, because the market price received in Manila approximated the price set under the subsidy law. However, in January 1955, Balatoc made a shipment under the act of about 8,337 ounces of gold produced last year. According to Judge Haussermann, Balatoc may be classified under the act as a marginal mine, but Benquet probably will not be so classified.

INDONESIA—The possibility of developing an iron mine in the Lampongs (South Sumatra) will be investigated by the following experts of the government's Planning Bureau: G. D. Bellows, mining specialist; W. W. Tamplin, senior mining engineer; G. V. Mueller, geologist; and four assistant geologists of the Department of Mining. The iron district lies north of Tandjung Karang.

WESTERN AUSTRALIA—As a result of unfavorable developments, *North West Tantalum N.L.* has ceased production. Recoveries were below estimates and the fall of the price of tantalum following cessation of the United States Government Purchasing Program caused a 50 percent drop in the buying price.

REPUBLIC OF THE PHILIPPINES—High-grade, low-carbon, ferro-nickel alloy can be recovered from the Philippine nickel-bearing material by electric furnace smelting, according to the results of the tests conducted by the United States Bureau of Mines Northwest Electrodevelopment Laboratory at Albany, Oregon for the FOA and the Philippine Bureau of Mines. The alloy recovered from calcined serpentine contains 68.3 percent iron; that recovered from calcined laterite contained 37.4 percent nickel and 61.6 percent iron. Overall results indicate that 35 pounds of nickel, as ferro-nickel, can be obtained from each ton of dry ore smelted. Feasibility of treatment on a commercial scale is seen.

UNION OF SOUTH AFRICA—The *Federale Mynbou Maatskappy* has acquired the controlling interest in *Fairview Consolidated Mines Ltd.* which wholly owns and operates the *Fairview* and *Three Sisters* mines in the Barberton district, and the rights over about 8,000 claims in the same area. These claims were developed for their gold deposits in the early days of gold mining in the area. The Fairview mine has been in production for some time, but no operations are underway in the Three Sisters. The Federale Company has also acquired a shareholding in a chrome-producing subsidiary of *Union Corporation Ltd.* The gold in the Barberton area occurs with various sulphides in fracture planes of the Swaziland system, usually in close proximity to massive granite formations, and considered to be of greater geological age than the Witwatersrand system. The fracture planes were formed by the intrusion of the granites into the Swaziland sediments. Values and mass of the orebodies are erratic.

ANGOLA—The *Angola Diamond Company's* operating program for 1955 originally provided for a treatment of 1,319,500 cubic meters of gravel, containing an estimated 702,000 carats of diamonds. However, an additional washing plant will be put into operation toward the end of the year and thus it is expected that this production goal will be exceeded. During the first five months of 1955, 391,958 cubic meters of gravel treated yielded 283,618 carats of diamonds. During the corresponding period of the previous year, 570,000 cubic meters were treated to recover 291,683 carats.

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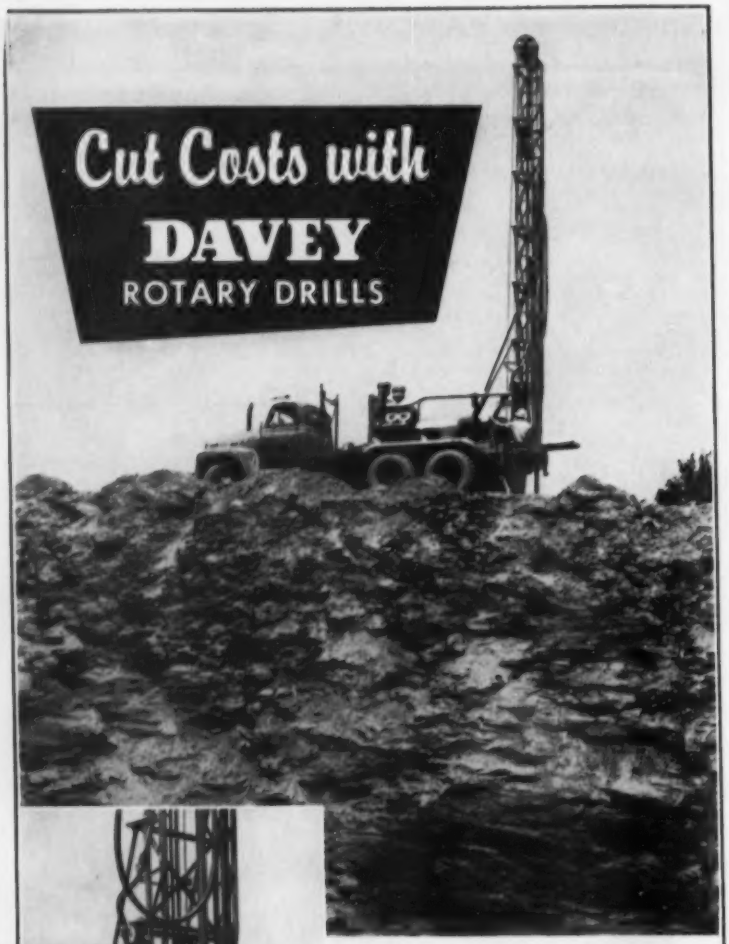


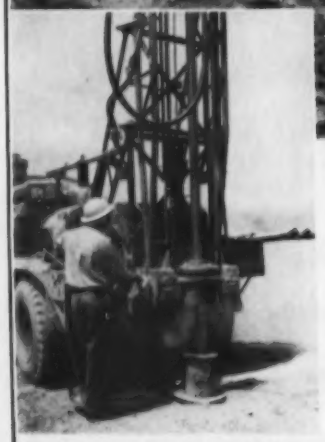

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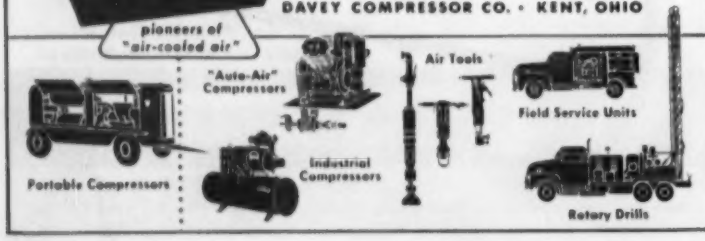




## INTERNATIONAL

FEDERATION OF RHODESIA AND NYASALAND—A site has been chosen by the *Kansanshi Copper Mining Company Ltd.* for its new concentrator and the flowsheet has been drawn up. All major items of the plant have been obtained second-hand from various sources in the Rhodesias and the Union of South Africa. It can be expected that the lower sulphide ores will be treated first because the less amenable oxide ores, of which considerable tonnages exist, are the subject of current laboratory tests. The main north and the main south shafts are already equipped for hoisting and pumping, and dewatering of the main south area is now in progress. At the end of June, the power plant consisted of three small Diesel generating sets, with a combined output of about 400 kilowatts, together with three portable compressors, but the permanent power plant has now been purchased from the Consolidated Diamond Mines of South West Africa and consists of three 1,000-kv sets.

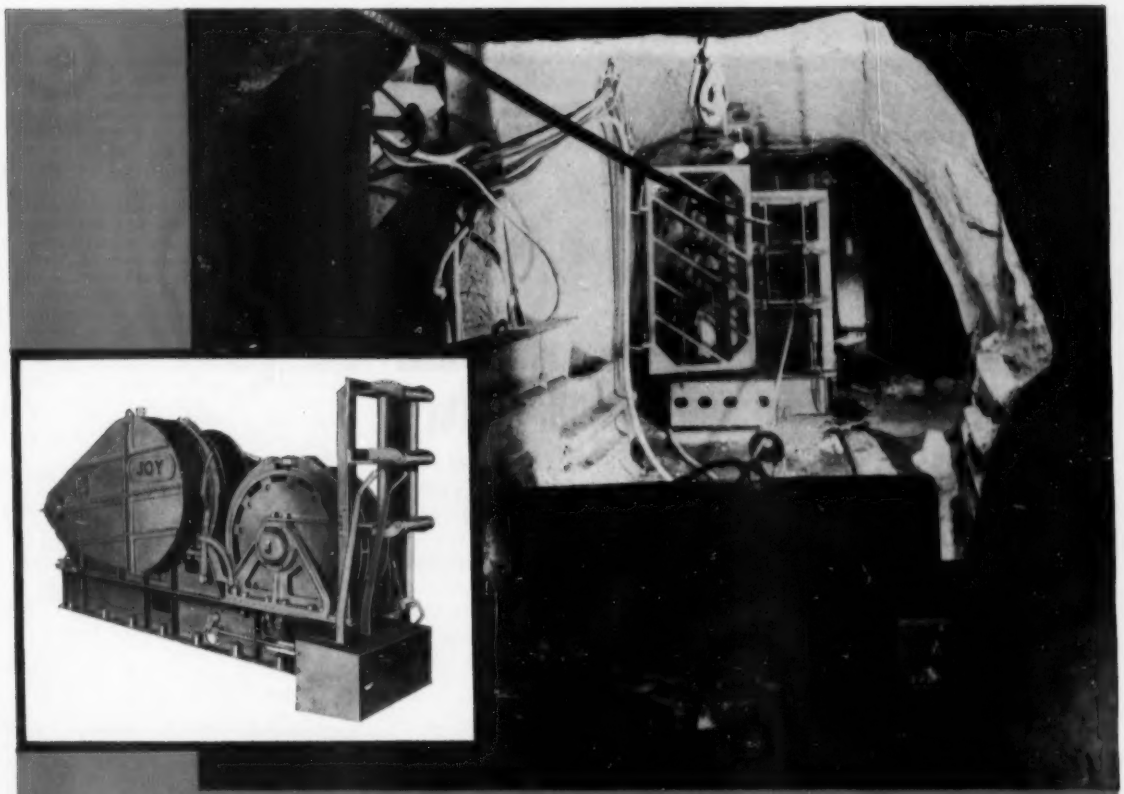
BASUTOLAND—The *Basutoland Diamond Corporation Ltd.* is reported to have found a large kimberlite pipe at the Kau stream, 25 miles southwest of Mont-aux-Sources in northeastern Basutoland. The pipe may be as much as 300 yards in diameter, and a fair number of stones of still unknown quality have been discovered. Jack Scott, founder of *Stilfontein Gold Mining Company*, and chairman of Basutoland Diamond, personally secured the three-year prospecting concession in Basutoland, and then ceded the concession to the Basutoland Diamond Corporation.

UNION OF SOUTH AFRICA—The uranium plant of *Dominion Reefs (Klerksdorp) Ltd.*, now in production, has been found to be capable of treating as much as 50,000 tons a month, compared with its designed capacity of 40,000 tons. The company has been authorized to operate the plant at its maximum capacity by supplementing the residue feed from dump with newly mined ore of about the same grade. Underground operations are being expanded accordingly.

SOUTH WEST AFRICA—The *Uis Tin Mining Company (S.W.A.) Ltd.* treated a greater tonnage in July, but the net recovery of tin in concentrates remains low. The estimated tin recovery in May, June, and July was, respectively, 0.091 percent, 0.102 percent, and 0.103 percent.

GOLD COAST—*Ashanti Goldfields Corporation Ltd.* reported at the end of June that its Eaton Turner shaft was only 135 feet short of reaching the final depth of 4,360 feet. The footage achieved during the three months ended June 30th was 242 which compares well with previous results and was caused by an improvement in the nature of the ground intersected. Nevertheless, it will be some time before the new shaft can be put into operation for haulage purposes from the shaft bottom because ore passes must still be driven and the bottom layout completed. However, it will be possible to start development operations on the lower levels of the Main Reef where some exceptionally high gold values have been encountered during the past two years.

UNION OF SOUTH AFRICA—*Rooiberg Minerals Development Company Ltd.* has completed the main facilities

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The 150 HP Joy XT-221, a large tandem two-drum slusher with chain drive, is used at Climax for this high-capacity slusher operation. Many of these heavy-duty machines work on a three-shift basis yet with remarkably low maintenance. During the loading of the first 3 million tons of ore from the Storke Level at Climax by 23 Joy XT-221 Slushers, *the only repair charge was for clutch band linings.*

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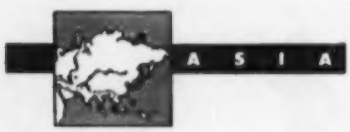
FEDERATION OF RHODESIA AND NYASALAND — *DeBeers Consolidated Mines Ltd.* has initiated exploration of diamonds in the Kanona area of Northern Rhodesia and has established an office at Broken Hill. The government of the territory has concluded an agreement with the company providing for the extension of prospecting operations and for the production of diamonds if payable deposits are discovered. An earlier concession to the company bestowed perpetual and exclusive rights, which, subject to certain conditions, will now be surrendered in 1986.

GOLD COAST—*Amalgamated Banket Areas Ltd.* is undertaking program of diamond drilling in the eastern and northern sections of the Pepe ore body which is expected to provide valuable information about the reef structure. The main shaft is being sunk with all possible speed to the 20th level, by-passing the 19th level, and it is expected that the development of the 20th level will be well underway soon.

TANGANYIKA—Special security measures against diamond stealing are being planned at Dr. J. T. Williamson's diamond mine at Mwadui. Concealed television cameras are being installed through which the security staff will be able to check every movement of all workers in important sections of the mine, and the actual handling of diamonds without being seen by the workers.

UGANDA—*Kilembe Mines Ltd's* huge construction program is proceeding on schedule with operation next year as planned. The hydro plant is to be ready in April, the concentrator in May, the roasting plant in June, and the smelter in August. Railroad construction is not as far along as originally hoped, but should be completed in time for operation next year. It will run 250 miles from Jinja, the smelter site, to the mine. The project will start at an initial rate of 40,000 tons monthly to produce 16,369,000 pounds of copper and 1,104,360 pounds of cobalt. The project is being financed by *Frobisher, Ltd., Colonial Development Corporation,* and *Uganda Development Corporation.*

UNION OF SOUTH AFRICA—*Standard Ore and Alloys Corporation* of New York has purchased the *Palmiet* chrome mine at Rustenburg in the Transvaal. The mine is presently producing 1,000 tons per month of high-grade, lumpy chromite and concentrates. Present plans call for additional mechanization and increase of tonnage to 4,000 tons per month, as well as a drilling program to increase present reserves to several million tons.




THAILAND—*Kamunting Tin Dredging Ltd.* reports that its No. 2 Kamunting Pangnga dredge, fitted with 8¾-cubic-

foot buckets, has started production on the Bangtoe area. The company purchased this area from *Rawang Tin Fields Ltd.* for £80,000 and the transfer of certain mining leases.

BURMA—*Burma Corportion (1951) Ltd.* is presently investigating the possibility of expanding the existing plant instead of constructing a new concentrating plant. For the quarter ended March 31, 1955, the firm mined 24,793 tons of ore, bringing the total for three quarters of the fiscal year to 76,574 tons.

TURKEY—The Turkish government is reported to have signed a contract with the *Krupp* firm of West Germany for the construction of a 600,000-ton steel plant. Estimated cost is £T150,000,000 which is to be financed by German long-term credits and Turkish banks.

MALAYA—Negotiations have been in progress between *Tanjong Tin Dredging Ltd.* and *Lower Perak Tin Dredging Ltd.* regarding the *Sungei Luas* mining leases owned by Tanjong. The latter has accepted an offer for purchase of these leases by Lower Perak Tin but it is subject to confirmation of ore values on the ore reserve plan by check boring.

BURMA—Insurgents are still preventing production from *Tavoy Tin Dredging Corporation's* property in Lower Burma and its five bucket dredges are still lying idle. The company believes there has been little, if any, progress in the past year toward resumption of mining. The number of incidents is less, but the insurgents dominate the roads and approaches to the mining area making all but small-scale tribute operations impossible. European staff members are still not permitted to visit the property.

PAKISTAN—The *Pakistan Industrial Development Corporation* and the West German firm of *Krupps* are reported to have reached complete agreement over the question of setting up an iron and steel plant in the Multan district. First plan had been to erect it at Kot Adu. The PIDC has asked the Pakistan government for approval of Rupees 60-crore plan.

INDIA—*Hewitt-Robins, Inc.* has been awarded contracts totaling $1,250,000 for conveyor belting and machinery to be installed by the *Indian Iron and Steel Company* at Burnpur. One conveyor system will bring iron ore down from the side of a 6,500-foot mountain at Gua where it will be placed on railroad cars and shipped 180 miles to the steel plant. At the steel plant, a second conveyor system will transfer the ore from the cars to blast furnace bins or nearby storage piles.

BURMA—The government of the Union of Burma is recruiting a special police reserve to assist in maintaining law and order in the mines in the Tavoy district. The government has also recently intimated that it is prepared to assist native mine owners to acquire mining machinery on a long-term credit basis. This machinery is likely to become available through barter agreements concluded with various countries purchasing Burma rice.

MALAYA—Yearly production figures have been released by some of the tin mining companies. *Rawang Tin Fields Ltd.* reports that total output, including 5.95 tons recovered during the No. 3 dredge trial run period, was 873 tons of tin concentrate with an average assay of 75.9 percent equivalent to 664.18 tons of metallic tin. *Kuala Kampar Tin Fields*

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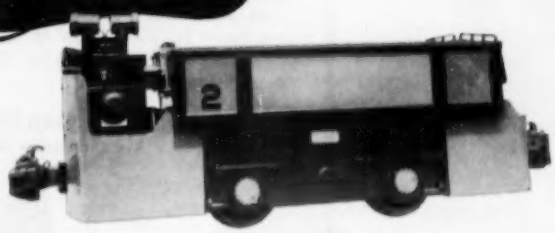

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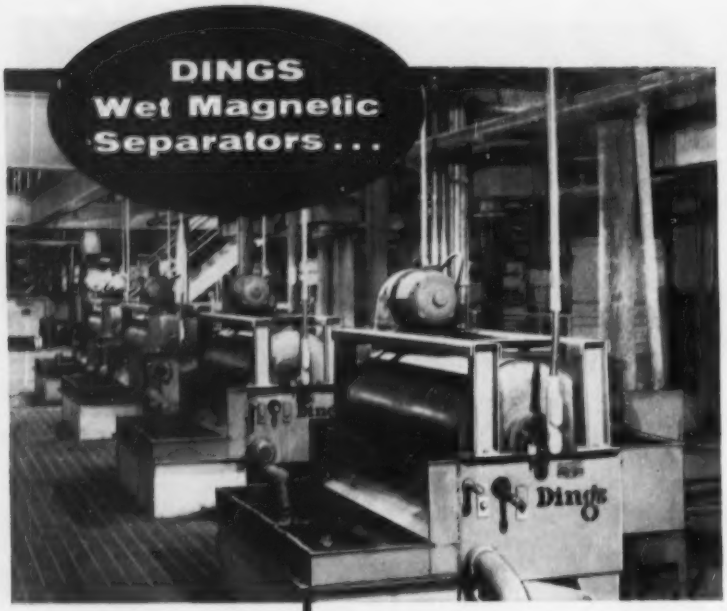


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produced 2,423.33 tons of tin concentrate, with average assay of 74.9 percent equivalent to 1,815.96 tons of metallic tin. The average assay of production for *Rawang Concessions Ltd.* was 74.7 percent; 487.32 tons of concentrate were produced making it equivalent to 364.15 tons of metallic tin. *Berjuntai Tin Dredging Ltd.* produced 724.76 tons of tin concentrates with average assay of 75.6 percent, equivalent to 547.57 tons metallic tin.

PAKISTAN—Agate and jasper deposits have been reported in the Baluchistan and Baluchistan States Union. The agate deposit is about 45 miles from Naukundi in the Chaga district, and the jasper occurs near Fort Sandeman and Bela.

MALAYA—The big columbite rush in the Paya Bakri area has petered out with many miners suffering large financial losses. Although the area is still the richest known columbite area in the country, no discoveries were made that were profitable enough to develop. The few hydraulic operations in the area had to rely on the gravels tin content to offset the expense of mining the columbite.

PAKISTAN—The government of Pakistan has decided to set up a Bureau of Mines for the protection and promotion of the mineral industry. The services of a Canadian expert reportedly have been secured.

ENGLAND—*United Kingdom Metal Mining Association* has been formed in London to promote and encourage metalliferous mining. One hundred charter members have been registered with the group. Sydney Taylor has been named chairman, and representatives of Johannesburg Consolidated Investment, Rio Tinto, John Taylor & Sons, Consolidated Gold Fields, British Metal Corporation, Selection Trust, and Anglo Austral Mines are members of the Association's council.

BELGIUM—The *Brussels Steel Export Cartel* has raised the minimum export prices by $2.50 per ton to all countries except the United States, Canada, and Switzerland.

NORTHERN IRELAND—A perlite deposit is being explored in County Antrim with experimental work giving indications of commercial workings.

SCOTLAND—*Siamese Tin Syndicate, Ltd.* has decided to continue exploration in the Lead Hills, Lanarkshire area, and a further expenditure of £62,000 has been voted. A gravity-flotation concentrator is being erected to treat the large reserve of tailing dumps which have been sampled. The development program also includes further underground exploration.

POLAND—The *Leczyca* mine at Lodz started production in July. Iron ore deposits in the area have been estimated at some 100,000,000 tons.

CORNWALL—Sale of low-grade copper concentrate by *Geevor Tin Mines* accounted for £50,000 of the firm's £109,706 in profits for the year ended March 31. The concentrate had been accumulating over a period of years, and as a result of the increased income the

company's board of directors has voted a 45 percent dividend. Last year's operational profit was £53,074.

FRANCE—Iron ore production during the first half of 1955 amounted to 25,265,000 metric tons, an increase of 16.7 percent over the 21,641,000 tons produced during the same period in 1954. Output this year has had a monthly rate of more than 4,000,000 tons.

WALES—*Halkyn District United Mines, Ltd.* reports that a substantial amount has been added to its ore reserves during the past year, with at least half of the lead production derived from development work. Main crosscut at the mine has been driven an additional 609 feet. Annual report of the company shows that lead output rose to 2,730 tons and zinc production was 798 tons. G. W. Cradduck is general manager of the operation.

ENGLAND—*Rio Tinto, Ltd.* has taken over the interest of *Johannesburg Consolidated Investment Company, Ltd.* in the *Riber* mine of *Derbyshire Lead Company, Ltd.*

NORWAY—The Norwegian government reportedly has rejected an application from the Swedish *Boliden Company* for a permit to develop pyrite deposits in Finnmark province. Instead, Norwegian geologists will make a thorough survey of the deposits.

WEST GERMANY—The first load of chrome ore from the Soviet Union to Germany since World War II arrived aboard the 1,269-ton freighter "Annemarie Krueger" in August. The ship had been loaded at the Soviet Baltic Seaport of Riga in Latvia.

CYPRUS—*Esperanza Copper & Sulphur Company* has hired a British firm of mill engineers to make a study of the Limni mill. During the quarter ended June 30, production amounted to 13,164 tons of ore from the Kinousa section and 9,997 tons of Limni sulphur ore. Shipments of Kinousa ore were resumed during April and a total of 28,560 tons were shipped during the quarter resulting in an estimated operating profit of £68,167.

FINLAND—The Finnish State Geologist has been testing a new "peat chemical ore prospecting" method based upon the capacity of peat to absorb minerals of the underlying rock. The new method has been applied in actual practice and is reported to be very successful. It is of special importance in Finland, since approximately 30 percent of the land area of Finland is covered by marshes and moors.

NORWAY—The *Norwegian Polar Institute* will send an expedition to Queen Maud's Land in the Antarctic late next year. Cost of the three-year expedition will be £220,000, and Parliament has been asked to grant an initial sum of £10,000.

CUBA—A new copper mine has gone into production near the city of Pinar del Rio. Known as the *Francisco* claim, it is being operated by *Compania Minera Occidental Bosch, S.A.* The firm says


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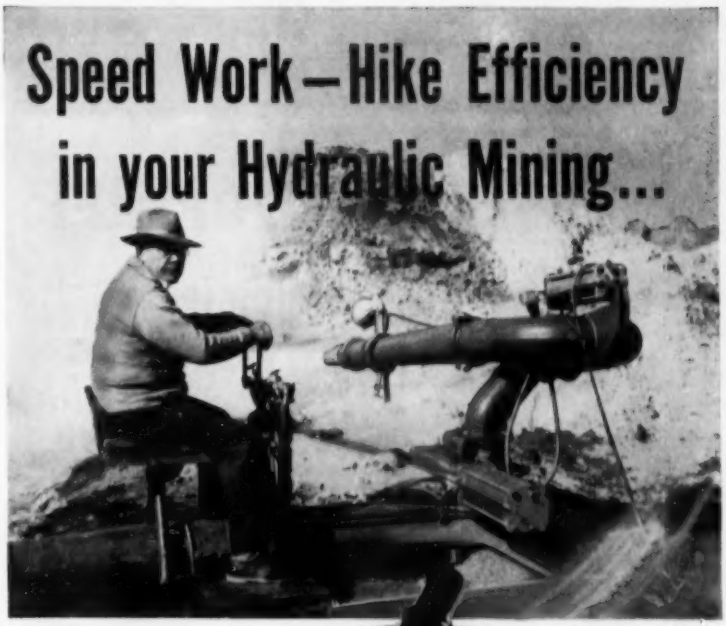

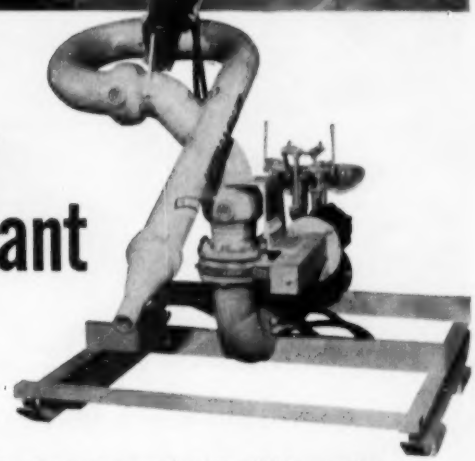

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that it is carrying out tests in an attempt to concentrate the ore on the spot. It hopes to process enough copper ore to make a shipment shortly to the *American Smelting and Refining Company's* smelter in El Paso, Texas.

MEXICO—*Industries Quimicas de Mexico, S.A.* plans to construct a sulphuric acid plant in the state of Michoacan. Company officials expect construction to start shortly, with completion planned in 1956. Initial capacity will be 100 tons per day, utilizing Mexican sulphur.

BRAZIL—According to official reports, an important mine has been discovered at Patos de Minas, state of Minas Gerais. The first laboratory test showed that the ore is of a complex type, formed by copper, silver, zinc, and lead compounds. Mining engineers of the principal mining companies are doing preliminary work.

BOLIVIA—*H. A. Brassert & Company* has started diamond drilling exploration of the *Mutun* iron ore deposit in southeastern Bolivia. The deposit is a large upthrust triangular block rising 3,000 feet above the level plain of the river basin, and several miles long on each side. Average quality of the ore is believed to be 50 to 55 percent metallic iron. It is also said to contain several million tons of partially leached ore from which a 60 percent iron concentrate could be produced. The nearby Paraguay River is navigable for ore barges ten months of the year and so the Mutun ores could be moved nearly 1,500 miles down river to Buenos Aires, Montevideo, and other cities in the Rio de la Plata basin.

COLOMBIA—For the quarter ended June 30, *Pato Consolidated Gold Dredging, Ltd.* dredged 6,373,700 cubic yards to recover 31,871 ounces of fine gold. In the same quarter of last year, 6,348,100 yards were dredged to recover 41,218 ounces. The lower production for the 1955 period was caused in part by the fact that dredge no. 3 was obliged to operate in low-grade ground during high water. Dredge no. 4 spent the greater part of June digging through tailings toward blocks of higher value ground, while dredge no. 6, which floated seven miles downstream during a flood in May, spent most of June digging through tailings on its way back upstream.

MEXICO—*Tungsteno de Mexico S.A.* has taken over *La Flaca* mine which was operated previously by *Martinez del Amo* and associates. The mine is located at El Rodeo, state of Durango, 13 kilometers west of the Mexico-Juarez Highway, and the concentration plant is installed about 700 meters from the highway. The plant treats 50 tons of ore daily with an extraction of 86 percent. Ore reserves are calculated at about 80,000 metric tons. Ore averages 1.5 percent tungsten. Enrique Padilla is president of the firm, with offices in Mexico City.

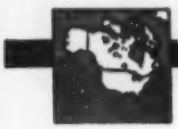
BRAZIL—The Departamento Nacional da Producao Mineral, Agriculture Department of Brazil, is studying a new process for the metallurgical treatment of complex nickel-silicate chromium-oxide ores which are very abundant in the country. At present the Departamento is treating ores from the *Liberdade* deposits, Minas Gerais state, where the ore contains 20 percent nickel. This deposit has been producing nickel ore for many years, and an electric furnace is currently producing nickel-iron alloys at the rate of 1.5 tons daily with a chromium content of 20 percent.

CUBA—*Canuba Manganese Mines* is currently developing its copper prospect in the vicinity of the Yabu River. A shaft is being deepened—one level to be at 65 feet and another at 110 feet. Four separate zones are indicated on the property. No. 1 zone will be opened up from underground to assess potential tonnage and grade, and then work will be started on the other zones. The company also controls large tonnages of manganese which are being put off for a while in favor of the copper deposits. Canuba is a Canadian firm.

MEXICO — Chuzo Sugawara, representative in Mexico of the *Dowa Mining Company Ltd.* of Japan, has announced that he and Y. Suzuki, company vice president, together with Michizo Kishi, mining engineer, and a group of Japanese, are organizing a company in Mexico to operate copper mines in the Ayutla district, Jalisco. These mines were abandoned several years ago when the low price of copper made continued operation unprofitable. The Jalisco government reportedly has granted the Japanese group full facilities. The concentrate will be shipped to Kosaka, Japan, for smelting and electrolytic refining.

COLOMBIA—Earnings of *South American Gold & Platinum Company* in the first half of 1955 were more than double those of the same period of 1954. Precious metal production by dredging in Colombia is ahead of a year ago. Platinum output in the first six months totaled 14,666 ounces, compared with 12,889 ounces a year earlier. Gold recovery for the first six months totaled 35,788 ounces, compared with 35,808 ounces in the first six months of 1954. The company's one-third investment in *Pato Consolidated Gold Dredging* also showed a good return.

BRAZIL—Argentina is reported to be considering buying zirconium ore from Brazil. These ores are found in magmatic rocks (large crystals of zircon and botryoidal masses of baddeleyite) or in small crystals associated with "black sands" and monazite sands. Zirconium minerals occur mainly in the states of Minas Gerais, Sao Paulo, Mato Grosso, Rio de Janeiro, Eperito Santo, Bahia, and Rio Grande do Norte. In 1951 and 1952, Brazil sold 1,600 metric tons and 1,700 metric tons, respectively, to the United States.




ONTARIO—*Noranda Mines Ltd.* has awarded a contract to Arthur G. McKee & Company of Canada Ltd., for construction of a 500-ton-per-day sulphuric acid plant in the Blind River area. To be completed next summer, the plant will be the largest sulphuric acid plant in Canada. Noranda has contracted with uranium mines for the supply of sulphuric acid necessary in the leaching process for the recovery of uranium. Noranda will use iron pyrite as the basic material in the production of the acid.

QUEBEC—*Duvan Copper Company* has started to cut its first station at the 150-foot level of its new shaft. Ultimate deph of the shaft is 500 feet, with stations to be cut at 250, 350, and 450

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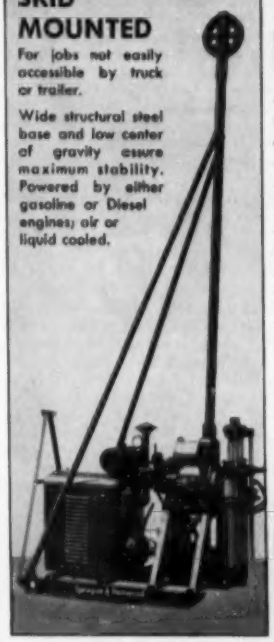

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## Grab Samples

continued from page 3

hopes that some change can be made in the future.

In the meantime I shall follow my former philosophy and not judge a book by its cover for I have found that the magazine itself is most invaluable for one who wants to keep up with the latest activities of the mining and mineral world. The directory issue is something that we all find most useful as a reference guide in checking names, owners, operators and addresses. Your market report in the directory issue was very well compiled and very informative.

There was just one thing more I found missing and I hope that you will change as soon as possible, even if you do keep the cover the same. I file my copies in a drawer file for reference and the last issue did not have the necessary volume number, title and date on the hinge. I feel that many of your readers keep their own files on your magazine and am sure that they will find this a hindrance in ready reference work when they find that the information is no longer on the edge of the magazine.

Other than these two items I can easily say that I am well pleased with the MINING WORLD and hope that you continue to do the fine job of keeping the industry informed.

A. W. ALLEN
Whittier
California

## INTERNATIONAL

levels. Some flat drill holes from the first level will investigate a copper zone outlined in surface drilling. The company's property is about eight miles southwest of *Normetal* in northwestern Quebec.

NEWFOUNDLAND—Diamond drilling has started on *Nudulama Mines' Long Pond* property west of the *Tilt Cove* mine currently being developed by *Bathurst Mining Corporation* and *Maritimes Mining Corporation*. Favorable geological and structural conditions were revealed in a preliminary investigation; the group is seeking copper. The property is on the west shore of Notre Dame Bay.

ONTARIO—*Pitch-Ore Uranium Mines* unexpectedly discovered a copper zone in drilling its uranium property at Wolfe Lake 30 miles north of Sault Ste. Marie. A geophysical survey will be made to trace the zone ahead of the drilling.

BRITISH COLUMBIA—*Bethlehem Copper Corporation's* activities in the Highland Valley, southeast of Ashcroft, have brought other mining firms into the area. *Northwest Ventures Ltd.* of Vancouver has staked 40 claims about six miles west of Bethlehem's holdings. *Western Tungsten Copper Mines Ltd.* and *Beaverlodge Uranium Mines Ltd.* have acquired 50 percent interests in 175 claims adjacent to Bethlehem. Surface exploration is underway. Also adjacent to Bethlehem, *Jackson Basin Mining Company, Ltd.* and C. W. Nash and associates are investigating copper showings on the jointly owned 27-claim *Transvaal* group.

ALASKA—The *U.S. Geological Survey* has released a report describing phosphate deposits on the Arctic Slope. These are the first such deposits reported in Alaska and were located during a geologic mapping program of Naval Petroleum Reserve No. 4 and adjacent areas.

MANITOBA—*Central Manitoba Mines* has abandoned its diamond drilling program on a gold prospect in the Flin Flon area after results were disappointing. The company is seeking other properties, and has appointed F. J. Scott as geologist in charge of exploration work.

NORTHWEST TERRITORIES—*New Alger Mines* is diamond drilling, trenching, and mapping its group of claims adjoining holdings of *Rayrock Mines* in the Marian River area. A high-grade pitchblende showing was located in previous work on the property. The company is also exploring its other claims in the area, which total 64 claims in five groups. In addition, the firm is examining its other properties in the Bathurst-Newcastle area of New Brunswick; the Blind River area of Ontario; and the Oka district of Quebec.

BRITISH COLUMBIA—*Kaslo Mines Corporation* of Spokane, Washington is rehabilitating underground workings at its lead-silver-gold-copper prospect near Howser in the Ainsworth mining division. H. G. Loop is president.

NOVA SCOTIA—On the million-acre concession of *Mineral Exploration Corporation* at Cape Breton, a diamond drilling program has been started on a second discovery at Rocky Brook where assays from the first drill hole indicated metal content running up to 3.2 percent zinc, 1.4 percent lead, and 1.0 percent copper. The first mine exploration pro-


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13 ISSUES

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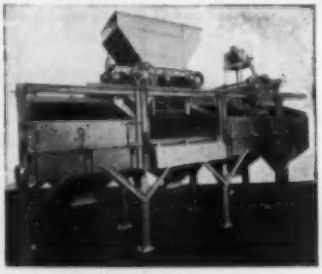

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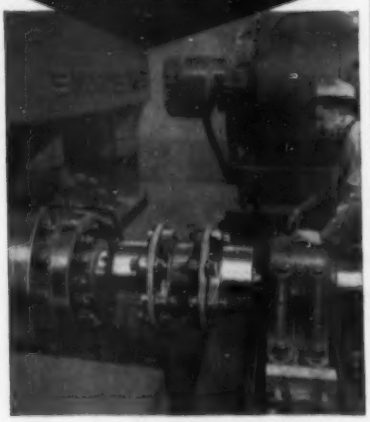

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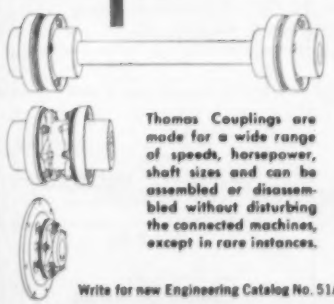

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gram, at Meat Cove, outlined zinc ore bodies with values in the range of 5 to 13 percent zinc and large-tonnage potential. Underground exploration of the zinc-bearing zone is well advanced.

BRITISH COLUMBIA—*Giant Mascot Mines, Ltd.* has staked 240 claims along the limestone formations between its main operation near Spillimacheen and its Lead Mountain prospect six miles to the northwest. A large body of low-grade ore is indicated at Lead Mountain. Production at Spillimacheen has been averaging about 540 tons of lead-silver ore daily. B. H. Gunning is managing director.

ONTARIO—*Temagami Mining Company* has constructed facilities for loading its copper ore into railroad cars at Temagami, about 60 miles north of North Bay. Regular daily shipments of 100 to 120 tons are expected to result. The company mines on an island in Lake Temagami, moves it to the mainland by barge, and then by road to the railway, a total distance of about 12 miles.

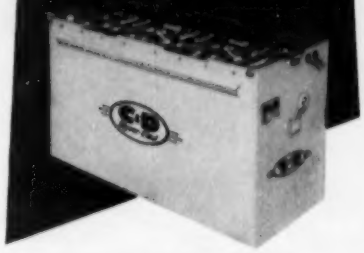
NORTHWEST TERRITORIES – A program of short hole flat drilling from underground is being laid out by *Rayrock Mines Ltd.* for its *Marion River* property starting in October. This will be followed by drilling to greater depths. Drifting is presently continuing in the No. 6 and No. 1 zones where a number of raises are planned. Drifting south of the adit cut has given a continuous ore length of 160 feet with the present face in high-grade pitchblende.

GREENLAND—At Mesters Vig on the east side of the island, *Northern Mining Company Ltd.* is making steady progress with its lead-zinc project. Two-year investigations on Blyklippen Mountain have indicated sufficient ore valued at about 100,000,000 kroner to make development economically feasible for six or seven years. Because the project is located in the arctic, with an average annual temperature of 16° F., the mills and flotation plant are being installed inside the actual mountain. The shops will be blasted out of the rock face, not only to save building materials, but also for reasons of temperature. Actual mining and processing are to begin in the spring of 1956. When the ice recedes during the summer of that year, the first ships should be able to approach the coast to collect the lead concentrate. It will be shipped to Denmark or other smelting works. About 20,000 tons of concentrate are expected to be shipped annually. The company is predominantly Danish, with Swedish, and Canadian participation.

BRITISH COLUMBIA – *Combined Developments Ltd.* is reported to have found molybdenite in the Altin area. The company has staked six claims covering the showing and possible extension. The deposit also contains an unidentified mineral currently being analyzed. Surface exploratory work is continuing.

ALBERTA—*Sherritt Gordon Mines Ltd.* is reported to be considering a 100 percent increase in capacity at its ammonia plant at Fort Saskatchewan. Present rated capacity is 75 tons a day. The increase would immediately permit sale of extra ammonia as agricultural chemicals and to supply chemical plants in the west. However, its long-range effect would be to increase the company's metal making potential, which utilizes a leach process. The Fort Saskatchewan metal refinery has overcome the difficul-

C&D Slyver-Clad Batteries CUT Hauling Costs



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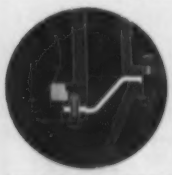

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ties which curtailed production earlier in the year and the plant should be turning out nickel at a rate 17 percent in excess of nominal capacity. It may also soon be producing 1,600,000 pounds of nickel a month from Lynn Lakes ores, while it is selling each month to *International Nickel Company of Canada* concentrates containing 1,000,000 pounds of nickel. The latter are from stockpiled concentrates.

ONTARIO—*American Nepheline Ltd.* has started a $2,500,000 expansion program. Expansion will include construction of a new crushing plant and ore storage facilities at the mine at Nephton, which will eliminate underground storage and provide greater crushing capacity. The plant will boost output capacity from 400 to 500 tons daily, and will be capable of further expansion to 1,000 tons when ready.

NEW YORK—*Standard Ore & Alloys Corporation* has been appointed as a United States licensee, with the right to sub-license, under the uranium leaching and precipitation processes controlled by *Canadian Patents and Development Ltd.*, owned by the Canadian government. The processes involved include the leaching of uranium, precipitation of uranium from alkali metal carbonate solutions, and the leaching of uranium from sulphidic materials. One of the processes is now being used extensively in the ore treatment plant at the Beaverlodge property of *Eldorado Mining and Refining Ltd.*


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**MINING WORLD**

First in

Mining News

# U.S.A. Metal & Mineral Prices

## METALS

| | | September 12, 1955 |
|---|---|---|
| COPPER: | **Electrolytic.** Delivered F.o.b. cars, Valley basis | 43.00¢ |
| | **Lake.** Delivered, destinations, U.S.A. | 43.00¢ |
| | **Foreign Copper.** Valley basis | 43.00¢ |
| LEAD: | **Common Grade.** New York | 15.00¢ |
| ZINC: | **Tri-State Concentrates,** jig, flotation 80% lead, per ton | $187.50 |
| | **Prime Western;** F.o.b. E. St. Louis | 13.00¢ |
| | **Prime Western;** Delivered, New York | 13.50¢ |
| | **Tri-State Concentrate,** 60% zinc, per ton | $84.00 |
| ALUMINUM: | **Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points | 24.40¢ |
| ANTIMONY: | **Lone Star Brand.** F.o.b. Laredo, in bulk | 33.00¢ |
| BISMUTH: | (In ton lots) price per pound | $2.25 |
| CADMIUM | **Sticks and bars.** 1 to 5 ton lots (Price per pound) | $1.70 |
| COBALT: | **97-99%,** keg of 550 pounds (Price per pound) | $2.60 |
| COLUMBIUM: | **Powder** Nom., per pound | $119.25 |
| LITHIUM: | 98% (per pound) | $10.00-$13.00 |
| MAGNESIUM: | **Ingots (99.8%)** F.o.b. Valasco, Texas, per pound | 33.70¢ |
| MERCURY: | **Flasks.** Small lots, New York | $255.00-$257.00 |
| NICKEL: | **"P" Ingots (5 pounds).** F.o.b. refinery, Port Colbourne, Ontario | 64.50¢ |
| TIN: | **Grade A. Brands.** New York (Price per pound) Pmrqpt delivery | 95.75¢ |
| TITANIUM: | **99.3% + Grade "A" (Price per pound)** | $3.50-$3.95 |
| GOLD: | **United States Treasury Price** | $35.00 per ounce |
| SILVER: | **Newly mined domestic.** United States Treasury price | 90.50¢ per ounce |
| | **Foreign** Handy Harmon | 90.75¢ per ounce |
| PLATINUM: | **Per Ounce** | $90.00-$94.00 |
| ZIRCONIUM: | **Sponge, Per Pound** | $10.00 |

## ORES AND CONCENTRATES

**BERYLLIUM ORE:** **10 to 12% BeO.** F.o.b. mine, Colorado ..... $47.00 per unit
Small lot purchases of Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.

**CHROME ORE:** F.o.b. railroad cars eastern seaports. Long tons dry weight.

| | |
|---|---|
| **African (Rhodesian). 48% $Cr_2O_3$. 3 to 1 Ratio** | $44.00-$45.00 |
| **African (Transvaal). 48% $Cr_2O_3$. No Ratio** | $31.00-$32.00 |
| **Turkish,** 48% $Cr_2O_3$. 3 to 1 chrome-iron ratio | $48.00 |

U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% $Cr_2O_3$ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% $Cr_2O_3$.

**COLUMBIUM-TANTALUM ORE:** At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)

**IRON ORE:** Lake Superior. Per gross ton Lower Lake Ports

| | |
|---|---|
| **Mesabi, Non Bessemer. 51.5% Fe.** Second quarter | $10.10 |
| **Mesabi, Bessemer, 51.5% Fe.** Second quarter | $10.25 |
| **Old Range Non Bessemer.** Second quarter | $10.25 |
| **Old Range Bessemer.** Second quarter | $10.40 |
| **Swedish,** Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit | 22.00¢ |

**MANGANESE ORE:**

| | |
|---|---|
| **Metallurgical grade.** 48 to 50% Mn. Long ton unit | $0.89-$0.91 |
| **Metallurgical grade.** 46 to 48% Mn. Long ton unit | $0.87-$0.89 |
| **Metallurgical grade.** 45 to 46% Mn. Long ton unit | $0.77-$0.82 |
| **Chemical grade.** 80% $MnO_2$. Per Ton | $70.00 |

**Domestic** U. S. Government are purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.

**MOLYBDENUM CONCENTRATE:** 90% $MoS_2$ F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers ..... $1.05

**TUNGSTEN CONCENTRATE:**

| | |
|---|---|
| **Domestic. 60% $WO_3$ Per** short ton unit | $63.00-$65.00 |
| **Foreign.** 65% $WO_3$ Per short ton unit (Scheelite) | $35.00 |
| **Foreign.** South American, Spanish, Portugese | $34.00 |

**URANIUM ORE:** **Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon. Green River, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained $U_3O_8$ plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime. At Monticello ores will be paid for in accordance with metallurgical characteristics.

**VANADIUM ORE:** **Carnotite-Roscoelite.** $V_2O_5$ in ratio of more than 10 parts to 1 part of $U_3O_8$ are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, Shiprock, and Bluewater ..... Per Pound $V_2O_5$ $0.31

## NON-METALLIC MINERALS

| | | |
|---|---|---|
| BENTONITE: | **Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots | $12.50 |
| | **Oil Well grade.** Packed in 100 pound paper bags | $14.00 |
| FLUORSPAR: | **Metallurgical grade.** 70% effective $CaF_2$ content per short ton F.o.b. Illinois-Kentucky mines | $28.00 |
| | **Mexican.** 70% f.o.b. border | $22.00 |
| | **European,** Atlantic Ports, 70% | $30.00 |
| | **Acid Grade.** 97% $CaF_2$ F.o.b. Kentucky, Illinois, Colorado | $50.00 |
| PERLITE: | **Crude:** F.o.b. mine per short ton | $3.00 to $5.00 |
| | **Plaster grades.** Crushed and sized. F.o.b. plants | $7.00 to $9.00 |
| SULPHUR: | Long ton, F.o.b. Hoskins Mound, Texas | $25.50 |
| | **Export** | $30.50 |

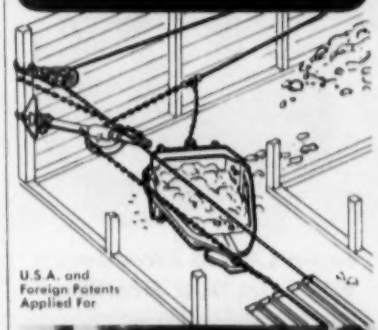
# LONDON METAL AND MINERAL PRICES

| | | September 12, 1955 Per Long Ton | | USA Equivalent cents per pound[1] |
|---|---|---|---|---|
| COPPER: | **Electrolytic spot** | £385 | 0s 0d | 48.12¢ |
| LEAD: | **Refined 99.9%** | £107 | 15s 0d | 13.47½¢ |
| ZINC: | **Virgin, 98%** | £ 92 | 10s 0d | 11.56¢ |
| ALUMINUM: | **Ingot, 99.5%** | £171 | 0s 0d | 21.375¢ |
| ANTIMONY: | **Regulus, 99.6%** | £222 | 10s 0d | 27.81¢ |
| TIN: | **Standard, 99.75%** | £744 | 10s 0d | 93.06¢ |
| TUNGSTEN: | **Long ton unit, 270s** | | | |

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.


THE REDESIGNED PACIFIC® "R-T-C" *is practically infallible*



U.S.A. and Foreign Patents Applied For

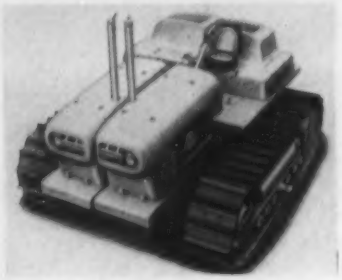
Let us send you Bulletin No. 259 which gives complete information on the redesigned Pacific "Round-The-Corner" Sheave Block with action pictures illustrating how it cuts costs wherever double slushing is employed.

**ALLOY STEEL & METALS CO.**

1048 E. 55th St., Los Angeles 58, Calif.
*Mailing Address:* Box 58323 Vernon Station, Los Angeles 58, California

# PRODUCTION EQUIPMENT PREVIEW

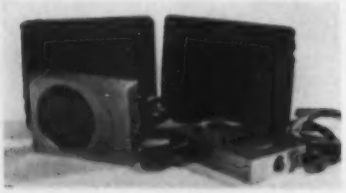
PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.



## Euclid's TC-12 Crawler Will Start New Size Class

Euclid Division of General Motors Corporation is now in limited production on its TC-12 Twin-Power Crawler Tractor.

In the earth moving equipment industry, the Euclid TC-12 with 40% greater weight, and 80% more H.P. than tractors currently in use, is expected to establish a new size of crawler tractors. The TC-12 incorporates many new operating and maintenance features that are exclusive with Euclid. Its outstanding feature is the use of two 194 H.P. Series 6-71 General Motors Diesels, each driving one of the tracks through separate Allison Torqmatic Drives consisting of torque converter and semi-automatic transmission. There is no master clutch. Circle No. 61 for further information.



## Optical-Reading Compass and Clinometer Available

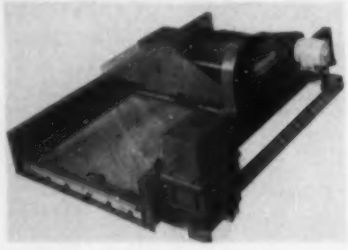
Now being imported from Finland is the Suunto Oy optical-reading compass and clinometer. These two instruments can take the place of the engineer's transit for almost all preliminary survey work. Featured on the compass is a new oval type magnetic needle. This needle collects a stronger magnetic field, than the conventional slim type, thereby making it less susceptible to local magnetic attractions. The optical scale can be accurately estimated to 10 minutes of arc. Heretofore this optical feature has only been incorporated into expensive theodolites and transits.

The instruments are self contained, and are of solid construction. There are no bubbles to center, screws to turn, nothing to adjust. No tripods or staffs are needed, and there are no accessories. For further information circle No. 72.

## Dorr-Oliver Laboratory Now Tests Uranium

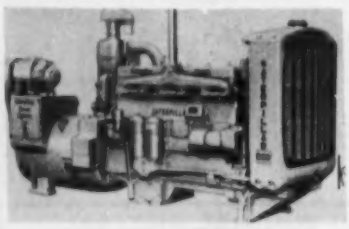
Dorr-Oliver Inc. announces that their Westport Mill Laboratories at Westport, Connecticut, are now fully equipped to handle all types of uranium extraction studies. A recent expansion of analytical, ion-exchange testing and other facilities has now made it possible to process small quantities of uranium ore at this location through all stages from the raw mined ore up to and including the yellow cake.

A complete and integrated service, to uranium producers is now available. For further information circle No. 67.



## No-Blind Fine Mesh Screen Offered by Diester

Much less difficulty is now encountered with fine mesh screening with the use of the Diester Concentrating Co.'s new no-blind, Model E FlexElex equipped Leahy screen. The screen features differential motion, by which means meshes are kept clear of intermediate size wedging particles. Also featured is FlexElex, which keeps the screen wires warm and dry for uninterrupted high production, possible only with complete elimination of blinding from any cause. A bulletin published by the company fully explains the operation of the screen. Send for yours by circling No. 54.



## Caterpillar Builds New Self-Regulated Generator

First of a completely new line of Diesel electric sets has been announced by Caterpillar Tractor Co. Combining the latest developments in design, materials and construction, the new self-regulated generator sets boast the same desirable characteristics of externally-regulated sets and also maintains the simplicity of operation and motor starting ability of former model self-regulated units.

The new self-regulated units are designed to meet the needs of applications now served by self-regulated or externally-regulated generators. Featuring close voltage regulation, they provide steady voltage from no load to full load. For more information circle No. 80.

## Gasoline Powered Drill For Multi-Purpose Use

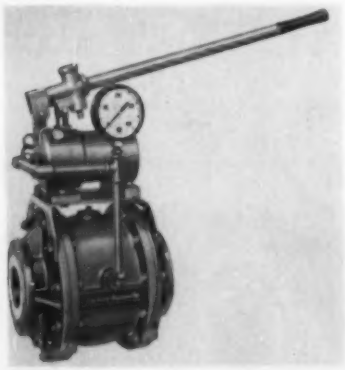
A combined rock drill and breaker, available from Stanco Manufacturing & Sales Company of Los Angeles, the Pionjar BRH 65 is a machine for general purpose use. The drill weighs only 86 pounds, is powered with a built-in gasoline engine. Drilling capacity, as rated by the manufacturer, is 16 inches per minute with a 1.06-inch bit. It is guaranteed to drill to a depth of 13 feet in granite. The machine is equipped with a floatless carburetor making it possible to drill from a horizontal position or at angles 45° above horizontal. Conversion from rock drill to breaker takes only a few minutes. Two standard sets of steel are supplied. One for drilling to a depth of 4 feet, and the other to a depth of 11½ feet. For further information circle No. 34.

## New California Relief Map Recently Published

A large colorful relief map of California has recently been published by Aero Service Corporation, of Philadelphia. The new map, printed in eight vivid colors on heavy plastic, is formed in third dimension, using a scale of 1-inch equals 16-miles (or a ratio of 1:1,000,000). The dimensions of the map are 41 by 47 inches. The map is very complete and can serve a variety of purposes. For more information circle No. 53.

## New Self Contained Rock Drilling Machine

The Ingersoll-Rand Co. has recently announced their new Triple Duty Drillmaster. The Drillmaster is a selfcontained drilling unit designed to speed up the drilling of rock and provide a range of holes sizes and drilling depths heretofore not available in a blast hole drill. Deep holes up to 60 feet and 6-inches in diameter may be drilled with the Depthmaster drill. In this case the bit is attached directly on the front head of the machine. The drill itself goes down the hole. The use of the Powermaster "out of the hole" drill is recommended on construction jobs where 4¾-inch holes up to 60 feet deep are indicated. Where the need is indicated the Roto-master "rotary drill" may be used. These three drills, together with a 600 cfm rotary compressor may be either truck or tractor mounted. For more information circle No. 57.



## Hydraulically Controlled Rubber Slurry Valve

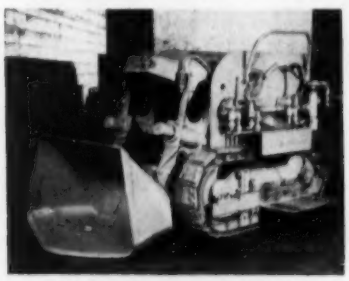
An advanced development in rubber slurry valves is announced by Equipment Engineers Inc., San Francisco, California. Stressing better control for abrasive and corrosive flows, the Krebs Rubber Slurry Valves are encased and rupture-proof, have maximum abrasion resistance, center orifice flow, and simple remote finger-tip control.

In the past, operators have clamped rubber tubes for flow control of abrasive and corrosive slurries. Pinching the tube gives no rupture protection, constricts the flow to a narrow slot, fails to close on grits, and, due to rusting of threaded stems, makes hand wheels difficult to operate. High pressure generated by hydraulic fluid acting upon a massive moulded rubber section of precise form, opens and closes the valve. The orifice holds to the center, and with even hydraulic pressure on the full external circumference, this orifice is round to the compressive limitation of the rubber mass at about 80% closed. Circle No. 79 for further information and brochure.

## New Easy-Use Hose Clamp Affixed in Three Seconds

A new type of general purpose hose clamp has been developed that can be fixed in place in three seconds with an ordinary pincers. Lasting and positive clamping action is assured under extreme internal hose pressure, hose movement and tough usage.

The clamp, manufactured by the Circle Clamp Corporation, New York, is round with U-shaped folds or lugs. The device is merely slipped on the hose or part and crimped in place by squeezing the parallel sides of the lugs together with pincers. Pittsburgh Testing Laboratories hydrostatic pressure tests on ⅝-inch O.D. wire braided hose, using this new type clamp, have shown no slippage or loss of clamping action at hose burst pressures ranging from 12,300 to 12,800 psi. For further information circle No. 70.



## Eimco Tractor Loader For Trackless Mining

The Eimco Corp. has announced the manufacture of its new model 630 tractor and tractor loader. This machine offers the mobility of trackless mining (including slope loading), and can also be used as a tractor and a bulldozer. It also features independently controlled tracks giving extreme maneuverability. With the addition of a suitable hopper, it can be converted into a self-loading transport. Other attachments such as lift forks, timber setting equipment, winches, and other devices will be forthcoming. The machine can be either air or electrically powered. Circle No. 78 for further information.

## New Lift Truck Has Panoramic Visibility

An entirely new concept in lift truck engineering, The Hyster Monomast, a revolutionary design consisting of one mast, is now available. The Monomast creates panoramic visibility heretofore impossible with conventional upright assemblies. The new Monomast which consists of two box-type sections, one telescoping within the other, allows the operator a clear, unobstructed view to both forks and load. Other features are increased torsional rigidity of mast, decreased mast deflection, increased hoist speed. Circle No. 58 for further information.

## Denver Reagent Feeder Provides Easier Operation

Production is now underway on the Model 12-A Denver Wet Reagent Feeder designed by Denver Equipment Company to provide easier operation, lighter weight, laboratory accuracy and greater volume. A stainless steel float valve moves freely, is corrosion resistant and permits quantity storage of reagents for continuous, uniform operation. The drip trough has greater capacity and is designed to make a finer adjustment in low capacity range. Extreme flexibility and convenience of operation have been stressed in the entire design. The entire feeder is protected from foreign material. A 1/20 hp motor and the speed reducer with 100 to 1 ratio provide unvarying speed of disc rotation. Circle No. 77 for more information.

# Why Some Prospectors Use Multiple Tube Counters

Until recently the uranium prospector had just two types of radiation detection instruments available to him—the scintillation counter and the single-tube Geiger counter. Each of these had its advantages and disadvantages. Manufacturers could see that a single instrument combining the advantages of the two, that is, the extreme sensitivity of the scintillation counter, and the ruggedness and dependability of the single-tube Geiger counter would suit the purpose of the prospector much better; thus, the evolution of the multi-tube Geiger counter.

There is nothing new in the idea of the multi-tube counter. Just as with a camera or telescope a larger lens or mirror will gather more light (a form of radiation also), the radiation detector's sensitivity can be increased by enlarging the sensitive area. A scintillation counter can be made to register more radiation per unit of time by increasing the size of the crystal or by adding other crystals to the circuit. A Geiger counter can be made to do the same by increasing the dimensions of the Geiger-Mueller tube or by adding more tubes to the circuit.

Models are on the market now with as many as 25 tubes, some of which are ordinary Geiger-Mueller tubes, while others contain bismuth-screen tubes.

The advantages claimed by the manufacturer for the multiple-tube counter are varied and many. Makers say they are very sensitive to low-energy gamma radiation, permitting weaker radiation to be picked up which sometimes escapes the scintillation counter. Steadier meter readings are also claimed for these multiple tube units. Elimination of jumpy, erratic needle movements which detract from the practical accuracy of any instrument can be achieved by increasing the number of tubes.

According to manufacturers failure of the sensitive elements in a multiple tube counter is not too serious a problem. Tubes can be replaced in the field, and the failure of one or more tubes in a counter does not put the whole instrument out of commission, it merely decreases its sensitivity. Instrument failures due to extremes in temperature and humidity have proven to be less common with multi-tube counters than with other types of radiation dectecting instruments.

Multi-tube counters are said to be very versatile. A multi-tube counter with a single-tube probe actually is two counters in one. Operating on all its tubes, it is ideal for airborne and carborne surveys, including gamma-ray detection of petroleum deposits. Then, of course, it is equally good for ground reconnaissance and grid surveys. Following that, detail exploration work and checking of specimens can be carried out using the single-tube probe. Field assays can be made with the instrument and it is excellent for logging drill holes.

The increasing acceptance by prospectors of the multi-tube counter gives concrete evidence that a radiation counter has been successfully developed combining the advantages of the scintillation counter and the single-tube counter.

VICTOREEN'S Bismuth Six-Pack is an accessory for the firm's popular Vic-Tic single-tube Geiger counter. Unit shown here weighs just one pound. This arrangement permits rapid reconnaissance with an instrument of relatively high sensitivity, as well as the convenience of working with a light weight single-tube unit for slower spot checking. Circle No. 63.

ATOMIC RESEARCH CORP., offers the ten-tube Arcotron at $475 and the ten bismuth-tube Bismatron at $750. Also available are extra tube banks for operators desiring greater sensitivity. Circle No. 68.

WESTERN RADIATION LABORATORY offers a 13-tube "W-13" model at $350 and a 25-tube "W-25" at $480. The 13-tube counter may be converted to a 25-tube instrument with approximately double the sensitivity. Circle No. 56.

NUCLEAR MEASUREMENTS CORPORATION introduce the 15 tube counter Halotron "15". Claimed to be waterproof and shockproof, the instrument carries a one-year guarantee. Circle No. 60.

WHITE'S ELECTRONICS makes the 3-tube Oremaster. Features are built-in speaker and extra-large meter. Sells for $295. Circle No. 64.

NUCLEAR-CHICAGO offers the ten-tube Oracle at $325. This compact, easy-to-operate instrument uses lead-cathode G-M tubes for which above-average efficiency is claimed. The instrument is accompanied by a one year warranty. Circle No. 71.

DETECTRON CORP. makes the 25-tube Nucliometer which has 19 conventional Geiger-Mueller tubes, and 6 bismuth tubes. Identical in appearance, except for probe, is the 24-tube Bismuth Nucliometer. All tubes in this instrument are of the bismuth-screen type. The Nucliometer sells for $545, and the Bismuth Nucliometer for $1295. Circle No. 59.

HANDLING ORE isn't the only mining problem. Many jobs around a mine or mill such as construction, setting machinery, loading or unloading machinery call for versatile equipment. Northwest Engineering Company will furnish you with information on their shovels and wide range of boom hoist equipment. Their machines are convertible from shovels or draglines to crane duty. Circle No. 1.

EDISON SELF SERVICE installations of miners lamps deliver maximum economy and efficiency for the operator. Mine Safety Appliances Company will be glad to explain their Edison Lamp Rental Plan which means you can have Edison dependability without a major initial investment. Circle No. 2.

WORDEN GRAVITY METERS may be leased or purchased from Houston Technical Laboratories. Bulletin GM-201 gives complete details. The Worden Gravity Meter is the world's smallest precision instrument for accurate gravity measurement, and is ideally suited for mine exploration both underground or on the surface. Circle No. 3.

HIGH SPEED HAULAGE under rugged conditions is a situation made to order for LeTourneau-Westinghouse rear dump, Tournatractor combinations. Capacities vary from 9 to 50 tons. For details circle No. 4.

DRILLER'S BOOKLET: Do's and Don'ts for Diamond Drilling is a handy, informative booklet available from Joy Manufacturing Company, manufacturers of core drills and motorized drill rigs. Circle No. 5.

UNDERGROUND OPERATORS should make a point of investigating Eimco Corporation's new, Model 630 crawler-mounted loader. The unit is designed for trackless mining and is either air or electrically powered. Circle No. 6.

GRINDING MILLS: Bulletin 6121 issued by Traylor Engineering and Manufacturing Company gives complete details on Traylor grinding mills. Each mill is individually engineered with your end product in mind; all sizes are available up to and including 1500 horsepower. Circle No. 7.

MINE CABLE: A new, improved and more flexible Tirex cable for powering electric drills, shuttle cars, loaders and shot firing is available from Simplex Wire & Cable Company. The improved cord is more flexible than ever and is jacketed with an oil resistant, cured-in-lead, selenium-neoprene armour. Circle No. 8.

NEW METAL DETECTOR: Dings Electronics, Inc., a subsidiary of Dings Magnetic Separator Company, is now offering what they term the lowest cost tramp metal protection available. The new detector will detect the presence of all magnetic metals that pass the search coil no matter what form they are in. For complete details circle No. 9.

NEW ROCK BITS: Development of the new Hawthorne insert rock bit has greatly increased the cutting capacity of Hawthorne bits in harder formations. The blades of the bit are interchangeable and replaceable permitting the use of many sets of cutting blades with one bit body. Sizes available range from 1⅞-inch to 6¾-inches. Circle No. 10.

CARBIDE BIT GRINDER: Your own personnel can dress a carbide bit back to almost new appearance and efficiency with Bitco, Incorporated's carbide insert rock bit grinder. Bitco will furnish a catalog describing the unit in detail. Circle No. 11.

FEEDER INSTALLATIONS: Bulletin 33-E-3 describes the entire feeder line made by Hardinge Company, Inc. All Hardinge feeders from 100-pounds-per-hour to 100-tons-per-hour, are suspended from the feed bin. This eliminates costly feeder support structure and provides accessibility to equipment following the feeder. Circle No. 12.

SHOVEL BUCKETS and dragline buckets designed for greater payloads with less maintenance are available from Electric Steel Foundry Co. All critical wear points on ESCO buckets are made of heavy-duty manganese steel castings. Castings for almost any mining requirement can be also furnished. Circle No. 13.

JEEP MOUNTED DRILL: The new Acker Drill Co., Inc., Teredo model is so light and compact that it can be mounted easily on truck or jeep and driven by a separate motor or power take-off. Even though it is small it can extract cores up to 2⅜-inches in diameter and can drill to depths of 600 feet. Circle No. 14.

REDUCE MAINTENANCE COSTS: Frazer, Weir, and Associates, Inc. of Chicago, Industrial consultants, specialize in their system of Controlled Maintenance Systems. This method, first introduced to the mining industry in Africa, has proven highly successful there and in the near East. Successful development of this system reduces maintenance costs, decreases production "down time," improves safety, and quality and prevents abnormal equipment depreciation. Circle No. 16.

PORTABLE DRILL RIGS: The Drilling Accessory Manufacturing Co. has introduced a new line of portable drill rigs for exploration and blasting. The new rigs are designed for fast Seismograph shot hole, blast hole or core drilling with only minor adjustments required for each operation. Obtain further information, Circle No. 17.

DIAMOND DRILL BITS: Bulletin 320 illustrates and describes all types and gives complete working data for Sprague & Henwood, Inc. diamond bits. Circle No. 18.

IMPROVED SCINTILLATOR: An improved version of the Engineers Syndicate Ltd. Model SC-10 scintillation counter is now available. The counter features an extra-sensitive prospecting range, background-eraser, time constant control, and a built-in battery condition indicator. This model may be used on foot, surface vehicle, or airplane. Circle No. 19 for further information.

EARTHMOVING EQUIPMENT by Euclid will be featured as part of the forthcoming General Motors Powerama. Shown publicly for the first time will be the new C-6 Crawler Tractor, and a new S-12 overhung engine type rubber tired tractor scraper. For more information circle No. 21.

AUDIO SAFETY SYSTEM: An interplant or mine communications system, is described in a recent bulletin published by the Mine Safety Appliances Co. Tailored to meet the needs of any installation, this efficient audio system can be used to transmit repeated safety reports, instructions, and other information which must be dispatched with speed and accuracy. Receive your bulletin by circling No. 22.

AMALGAMATION ABC: Bulletin No. A4-B3 published by Denver Equipment Co., explains in detail the process of recovering gold from ground ore. The treatment of concentrates resulting from concentration methods is explained with data and photographs. For your copy circle No. 23.

AIR-LINE LUBRICATORS: This interesting bulletin just released by the Inger-

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| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
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soll-Rand Co. describes air-line lubricators used with the smallest hand-held tools to the largest quarry type drills. For complete information regarding these various types of lubricators circle No. 24.

NEW SCINTILLATION INSTRUMENT: The Engineers Syndicate, Ltd. of Hollywood has announced the availability of a new model airborne scintillation instrument. This model which is twice as sensitive as their preceding model features a larger crystal, 3 extra sensitive detection ranges, 3 time constants, and a background erasing control. For more information circle No. 27.

A NEW, COLORFUL 40-page bulletin in its complete line of excavating and materials handling machines is currently being offered by the Marion Power Shovel Co. of Marion, Ohio. Bulletin 403-C features action photos and condensed specifications of each basic machine type, as well as Marion's role in power shovel history. Circle No. 28 for your bulletin.

PROBLEMS IN MATERIAL HANDLING may be solved with the use of Durs Flexion-Flange belts. Utilization of the Dura-Belting Manufacturing Co.'s new combination Flange and Cleated Belt can result in handling more material at less cost. Circle No. 29 for more information.

NEW DESIGN advancements have been incorporated in Link-Belt Company's popular DS takeup. This design features a new arch frame design, new one-piece hinged top frame, rigid channel base, and a sturdy adjusting screw. The takeups are available with babbitted, ball or roller bearings. For complete information circle No. 30.

NEW MOVALL WAGON for Cat DW15 tractors has been announced by the C & D Manufacturing Co., Perkins, California. This multi-purpose RD15 "scraper-in-reverse" wagon has a heaped carrying capacity of 16 cubic yards, and a carrying capacity of 22 tons. The many new features on this new earth moving machine can be fully explained to you by circling No. 31.

ATOMETER: A simple slide rule for the uranium producer and prospector. Compute in a flash the price your uranium and vanadium ore will bring. Price just $2. To find out more about this novel instrument circle No. 35.

NEW INFRARED SPECTROPHOTOMETER BROCHURE: A four page bulletin describing Beckman's new automatic infra-red spectrophotometer is just off the press. The model IR-2A described is a high-performance, low-cost instrument suited to both research and quantitative analysis. For your copy circle No. 36.

NEW BULLETIN covers Geiger and Scintillation Counters. A complete line of portable geiger and scintillation counters for uranium prospecting is described and illustrated in the new 8-page bulletin now available from Nuclear Measurements Corp., Indianapolis, Ind. The bulletin covers specifications, construction features, and prices. Receive your copy by circling No. 39.

BIGGER, PACKAGED COMPRESSOR: Ingersoll-Rand has added a new air cooled 125 HP electric-driven air compressor to its Type 40 stationary compressors. This new size is expected to fulfill the need of industry for a lightweight compressor that can be easily moved from job to job. Further information may be obtained by circling No. 41.

NEW HIGH PRESSURE HOSE is capable of handling pressures up to 5,500 psi. Developed by Goodyear Tire and Rubber Co.'s Industrial Products division, this hose is wire reinforced and is available in sizes from 5/16- to 2-inches outside diameter. For more information circle No. 43.

INSTRUCTIONS FOR THE DRILLER: Increased efficiency, and longer drilling life may be realized from your Seco carbide tipped drill rods by following factory recommended procedure. The Great Western Steel Co. of Los Angeles is now offering a booklet of drilling instructions. For your copy circle No. 44.

URANIUM as well as oil may be found with the use of Radiac's Model 105D Prospectoscope. This rugged geiger counter can be used from a plane, an automobile, on foot, or for radioactivity logging of drill holes. The counter features 5 sensitivity ranges, a built-in loudspeaker, and versatile accessory equipment. For more information circle No. 45.

PORTABLE MOTEL for your prospecting comfort. While in the field your housing problems have been solved for you by Nuclear Instrument Corp.'s new portable motel. This unit is designed to fit any pickup truck bed. Find out more by circling No. 46.

NEW TYPE JAW CRUSHER for testing, research, and sampling laboratories. The A. W. Fahrenwald Co. Wave-impact Jaw Crusher is new in engineering design, operating principle and performance. Crushing is by impact—no rubbing. Rock flows through crusher like water. For more information concerning this sensational crusher, circle No. 47.

INCREASED HORSEPOWER: A boost to 103 drawbar horsepower at 1450 r.p.m. is a feature of the increased horsepower International TD-18A Diesel crawler tractor, now in production by International Harvester Co. The horsepower increase brings the TD-18A into the big tractor class—enables it to tackle tougher, more demanding jobs. For additional information circle No. 49.

HEAT TREATING AND FORGING of several types of Bethlehem Pacific's mining and quarrying steels is the subject covered in their new bulletin. Complete forging and heat treating data may be obtained from this publication. Be sure and get yours. Circle No. 50.

NEW IDEA in wet screening introduced by Allis-Chalmers. The A-C pool washing screens for handling a wide variety of materials, are described in their new bulletin no. 7B8214 "Pool Washing Screens." Circle No. 51 for your copy.

10% MORE BATTERY CAPACITY: C & D Slyver-Clad mine batteries offer 10% more capacity due to longer, heavier plates in a standard size tray according to the manufacturer. You get more power per cubic inch of battery, and more work for less cost. In addition the exclusive five-fold Slyver-Clad plate insulation virtually eliminates shedding and sedimentation. The C & D Mining Battery Bulletin will tell you how you can increase your mine battery efficiency and reduce your hauling costs. For your copy, Circle No. 48.

PERCENT METER on Precision Radiation Instruments' new model 107C enables you to determine the approximate value of your uranium ore right in the field. A red flag indicator shows when the counter is turned on thus preventing unnecessary battery drain. Price, $149.50. Circle No. 37.

NEW ALL PURPOSE counter, Engineer Syndicate model SC-10 is designed for the prospector, operator or engineer. It can be used in the field for mobile or airborne surveys, for drill hole logging or radiometric assaying. The instrument is equipped with a direct reading scale for $U_3O_8$ percentages. Circle No. 38.


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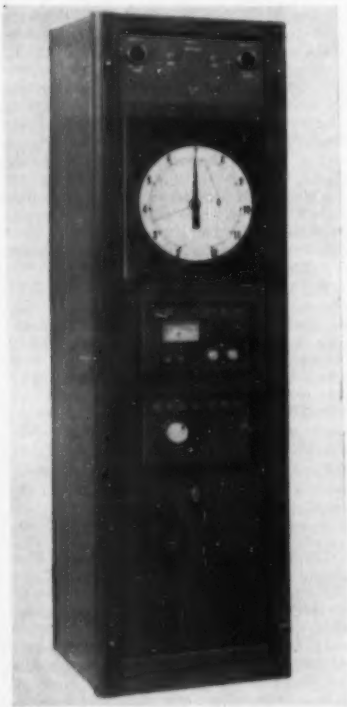
## Four-Wheel-Drive Vehicle By International

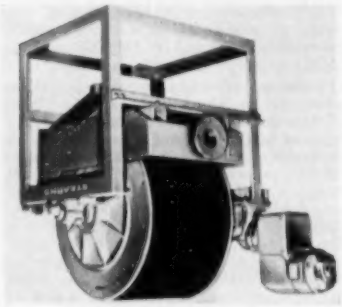
A new four-wheel-drive, light duty International truck with power and Traction to travel cross-country fully loaded in mud, sand or snow has just been introduced by International Harvester Export Co. The truck is available with pickup, stake or flatbed body, or as a chassis and cab for a special body.

In proving ground tests, the R-120 (4 by 4), fully loaded, climbed a 56 per cent grade handily. This new International can be operated on hard-surface roads as a conventional rear-wheel drive truck, while the front axle drive can be engaged quickly and easily by a shift lever. Circle No. 62 for further information.



## Ready Made pH System Available From Beckman

A "packaged" pH control system, designed for use in any pH process application, has been announced by the Beckman Division of Beckman Instruments, Inc. in their Bulletin 384. These systems combine in a single package all the components needed for single or multiple channel pH process monitoring, recording and controlling. The entire system is built at the factory and assembled ready for plug-in installation. The basic components can be assembled into a number of different combinations from the simple combination of pH meter and alarm to the multiple-channel monitor-recorder-alarm-control system. For information on these systems and their applications, circle No. 75.



## New Separator Recovers Media in HMS Processes

The Stearns "WPD" Model "M" Permanent Magnetic Drum Separator has been designed to provide efficient magnetic recovery of magnetic media as used in heavy density separation plants. Made by Stearns Magnetic, Inc., the separator incorporates a fixed magnet assembly mounted inside an outer rotating cylinder. The cylinder acts as a carrier for the magnetic solids attracted to the magnet assembly. The separator is so designed as to produce a thickened magnetic concentrate product sufficiently high in specific gravity to be re-introduced into the heavy media vessel. For more information circle No. 66.

## New A-C Motor Scraper Has 15-Yard Capacity

According to announcements, the new Motor Scraper, the TS-360, currently in production by Allis-Chalmers Manufacturing Company, establishes a new high in dirt-moving ability. Statistically, the TS-360 weighs 49,000, has a 15-cu-yd. struck capacity (20-cu-yd. heaped capacity) and features a new 280 hp. Allis-Chalmers Diesel engine.

One of the most fundamental changes in this Motor Scraper is the introduction of a completely new tractor main frame which makes possible all the advantages of "unit construction." This facilitates easy removal and servicing of both major and minor assemblies. Other operating advantages are selective steering, double-safety air brakes and a multiple-disc cable control unit which provides immediate response to movement of the control levers. Also added to the TS-360 is a direct electric starting system with the ignition completely controlled with the key. For the complete story on the TS-360, circle No. 73.

## New Survey Meter Offered By Menlo Research

A new light-weight survey meter for gamma and beta radiation is announced by Menlo Research Laboratory, Menlo Park, California. The Mark VII geiger counter contains a separate probe made of plastic and which houses a geiger-muller tube. The instrument is priced at $133.50. For literature circle No. 65.

## New "Cat" Scraper Has Redesigned Diesel Engine

The new Caterpillar DW21 (Series C) Tractor with No. 470 Scraper features a redesigned Diesel engine rated at 300 horsepower at 1800 rpm. The scraper is wider and longer and has the new "low-bowl" design for easier and more economical loading of materials. Caterpillar Tractor Co. also introduced another new rubber-tired tractor, the DW20 (Series E). For further information circle No. 69.

### Notes From The Manufacturers

**WALTER WEHTJE (left), managing director of Atlas Diesel Corporation, Stockholm, Sweden, and ALLAN PERHAM, sales director for the firm, display the lightweight one-man rock drill that has played an important part in Sweden's "underground industrialization" program. Messrs. Wehtje and Perham, whose company manufactures the drill, have just completed a tour of Atlas Diesel's United States distributors. This included a trip to Copco Pacific Limited, which is located at San Carlos, California.**

*M. B. Garber* and *E. C. Brekelbaum* have been elected vice presidents of The Thew Shovel Company, Lorain, Ohio. Mr. Garber, director of sales for the firm, has been with Thew 28 years. Mr. Brekelbaum was formerly vice president and executive chief engineer for Harnischfeger Corporation.

## Daybreak-Morning Sun Merger Approved

Shareholders of Daybreak Uranium, Inc., and Morning Sun Uranium, Inc., have approved a merger of Morning Sun into Daybreak on a share-for-share basis. The merger is contingent upon Morning Sun acquiring a promised lease on the Spokane Indian Reservation, however.

Both firms recently leased radioactive ground in Ferry County, Washington. Morning Sun assets include $120,000 cash and considerable acreage adjoining or near Daybreak. On one of the leases, autunite has been exposed at the surface for 100 feet.

Daybreak recently completed an initial 500-ton "off-the-Colorado-Plateau" shipping contract with the U.S. Atomic Energy Commission, and has now received a second contract. The new one calls for 20 cars from Daybreak and 25 cars from Morning Sun. The firm is confident it can ship a carload a day from its ore deposit in the western foothills of Mount Spokane in Spokane County, Washington.

Mining costs for the initial ten cars shipped by Daybreak ran about $1.50 per ton, not including the trucking some 30 miles to the railroad siding at Spokane. The first car averaged 0.28 percent uranium oxide; the second 0.32 percent; and the third 0.46.

J. J. Oberbillig of Boise, Idaho has sold the *United Mercury* mine and mill at Stibnite to *Holly Uranium Corporation* of New York for $1,350,000. The buyers, who also operate in Rance, New Mexico, plan to rebuild one of the mercury furnaces.

Drifting in the west end of the *Hercules* mine, Burke, Shoshone County, Idaho on the bottom 1600 level has developed a zinc-lead-silver ore shoot of better-than-average grade over a distance of about 500 feet. The mine is owned and operated by *Day Mines, Inc.*, Wallace. Henry L. Day is president.

*Sunshine Mining Company*, big silver producer in Shoshone County's Coeur d'Alene mining region, is acquiring a half interest in Custer County lead-zinc-silver properties acquired recently by *Highland-Surprise Consolidated Mining Company*, a former Coeur d'Alene district zinc-lead producer. The Stanley Basin properties include the *Deer Trail, Confidence,* and *FDR* groups and 20 adjacent claims located by Highland-Surprise. Frank J. Luedke, Spokane, is president of Highland-Surprise. Ross D. Leisk is Sunshine general manager.

*Idaho Custer Mines, Inc.*, at last report, was milling a 2,200-ton stockpile of lead-zinc-silver ore accumulated last fall by block leasers. A half dozen former Coeur d'Alene district miners now have leases. Alvo V. Alvensleben, Seattle, is president and manager.

*Porter Brothers Corporation* at last report had resumed its dredging operations in Bear Valley, Idaho. After only 10 days of dredging, it had shut down to acquire additional chemicals to clear settling ponds.

*Ductile Iron and Alloy Foundry Company*, new Osburn, Idaho firm, is constructing a $100,000 foundry near Polaris in Shoshone County. Utilizing a process patented by *International Nickel Company*, the plant will provide alloyed castings for the area's mines, smelters, lumbering, aluminum, farm machinery, and other industries. Equipment will include an electric furnace of 1000-pounds-an-hour capacity. Operations are scheduled to start late this month with a crew of 15. Eugene Brower will be general manager and secretary-treasurer. Ralph Neyman is president.

The *J. R. Simplot Company* is diamond drilling its barite property at Hailey, Idaho, under the supervision of Slim Robinson, and is further exploring and developing its large phosphate holdings in the Centennial Range in Idaho and Montana under the direction of staff engineer Joe Jemmett. At the Fort Hall phosphate mine, sales to Westvaco are progressing at the rate of 140 railroad cars a day, or approximately 10,000 tons per day.

Recently incorporated in Idaho are the following: *Panhandle Uranium* at Coeur d'Alene by Ronald E. Eggart of Kellogg, and Mervin D. Selle and G. Dale Don of Coeur d'Alene; *Bachman and McKennon Inc.* at Oreana by Earl M. and Margaret Ann Bachman of Oreana, and William Floyd and Agnes Barbara McKennon of Snohomish, Washington; *Spartan Mines Inc.* at Boise by C. F. Barnhill and William G. Didrickesen of Salt Lake City, Utah, S. E. Ingram of Holloday, Utah, and Clifford Ewell of Midvale, Utah; *Sawtooth Metals* by George D. Lowers and John A. Gochenour, both of Pocatello, and George Belknap and William L. Jenkins, both of Blackfoot; *Anderson-O'Keefe Company* at Grangeville by A. D. and Marie Anderson of Milwaukie, Oregon, and Wallace R. O'Keefe of Portland, Oregon.

*Big Salmon Uranium, Inc.*, Lewiston, Idaho, is test drilling its holdings 16 miles east of Riggins. Equipment is furnished by *Andrews Equipment Service*, Spokane. Additional uranium mineralization was found recently. James S. Aram is company secretary.

High values in thorium oxide and subcommercial values in uranium oxide have been shown in new assays of ore samples from the Boundary County, Idaho, properties of *Northwest Prospecting and Development Company* of Spokane. The properties on Hall Mountain include the old *Golden Sceptre* gold-copper prospect. Clarence H. Sheldon and Carol W. Greear are company officials.

Taylor Darden, resident manager at Salt Lake City for *Central Farmers' Fertilizer Company*, which represents 16 midwest farmer-producer co-operatives, reports plans by the firm to build a $5,000,000 electric furnace to produce elemental phosphorus at Georgetown Canyon, near Montpelier, Idaho. The co-operative may complete negotiations with the *Utah Power and Light Company*, for power to serve the 35,000-kva electric furnace. Construction may begin in 1956. Previously the firm had planned to use power from the proposed federal dam at Hells Canyon on the Snake River.

## Silver Mountain Shaft Sinking Ready To Start

**At the Silver Mountain Lead Mines' property east of Mullan in Shoshone County, Idaho, Hecla Mining Company is preparing to start sinking of a 2,000-foot, three-compartment, vertical shaft. Preliminary work is nearing completion. It included transferring of a headframe from Hecla's Rock Creek project east of Wallace, and the installation of a 200-horsepower hoist. In the photograph above, workmen preparing to hoist the assembled shaft headframe into position. The top of the shaft had been poured with in concrete and a rope raise had been holed through an adjacent rock cliff from a short tunnel. The deep development is being done by Hecla and Bunker Hill and Sullivan Mining and Concentrating Company under a $1,058,366 lead-zinc-copper DMEA exploration contract.**

*Montana Standard Mining Company* is trucking lead-silver-zinc ore from its *Prospect Creek* property near the Idaho

border over Glidden Pass to the Golconda mill east of Wallace, Idaho. The ore is from a 1,200-ton stockpile mined last winter. Plans call for mining sufficient ore above the adit level to finance deeper development and mill construction. The property, reopened in 1952, yielded direct smelter shipments early in the century. Loy Vose, Wallace, is president and mine manager.

*Oro Mining Syndicate, Inc.*, Kellogg, Idaho, has opened lead-silver-zinc ore in No. 3 tunnel at the *St. Paul* property 17 miles south of Libby, Lincoln County, Montana. *Silver Star Mines, Inc.*, Wallace, has made an initial payment on an option to purchase a half interest for $12,500. A. L. Osborn is president of Oro.

*Silver Bow Uranium Corporation*, a new Idaho firm, has moved diamond drilling equipment onto a 30-claim uranium prospect east of Melrose, Montana on the boundary of Madison and Silver Bow counties. Bulldozing and trenching reportedly yielded favorable results. Fred Hermann, Helena, is secretary-treasurer.

H. W. Carver is rehabilitating the East Pacific mill near Winston, Montana and readying it to treat ore from the *January* mine in the same general vicinity. Mr. Carver and associates have sunk a shaft to approximately 200 feet at the old *Dunsten* mine near Elkhorn, Montana. At the present time crosscutting operations are being carried on to intersect the vein on this level.

The *Montana Uranium Producers Association* reportedly has been asked to assist the *Catalytic Construction Company* of Pennsylvania in a research program aimed at developing a process for concentrating uranium ores. The association has been asked to furnish samples of various types of marginal ores for study, and so it has asked Montana prospectors and producers to submit uranium ore samples.

The following mining firms have been incorporated in Montana recently. *Consolidated Metal Exploration Company* at Hamilton by John Walters, David L. Foss, et al of Hamilton; *Boulder River Uranium Company* at Big Timber by Catherine P. Webber, Edwin D. Webber, Perry Bolkely, and George Jellea; *Broadwater Explorations Inc.* at Townsend by T. E. Connors, Dennis Myers, both of Townsend, and H. D. Moulton, of Helena.

The establishment of the Verner A. Gilles Memorial Loan Fund at *Montana School of Mines* has been announced by Dr. J. R. Van Pelt, president. It is sponsored jointly by the *Billings Geological Society* and the *Northern Pacific Railway Company*. The grant consists of a $400 loan, awarded annually to a student majoring in mining or petroleum geology or geological engineering. It is designed primarily for a senior needing financial assistance to complete his undergraduate education, but may—subject to the discretion of the School of Mines—be given to a junior or graduate student. Verner Gilles made his most lasting and important contributions to geologic knowledge in the State of Montana. He served as chief geologist for the Northern Pacific from 1940 to his retirement in 1954, just a few months before his death. He was also a charter member of the Billings Geological Society.

## OREGON

Development of the *Haggard-New* chromite mine, Grant County, Oregon has been taken over by *Comstock Uranium-Tungsten Company* of Elko, Nevada.

The Oregon Department of Geology and Mineral Industries has confirmed uranium discoveries on Augur Creek near Lakeview, Lake County, Oregon and in the foothills of Steens Mountain, Harney County. Autunite and torbernite are principal minerals.

## WASHINGTON

Thirteen diamond drill holes put down by the U.S. Atomic Energy Commission at the *Midnite* uranium mine in southwestern Stevens County, Washington indicated general continuity of mineralized zones. They also showed that the ore was not limited to a granite-argillite contact but was also found some distance from the contact within the meta-sediments. Most of the uranium found in the holes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was autunite and uranophane but uraninite associated with pyrite was found in relatively unoxidized material. The property is being operated by *Dawn Mining Company*, a subsidiary of *Newmont Exploration Company*, New York City.

*Sherman Creek Uranium Mines, Inc.* of Republic, Ferry County, Washington, has added an 80-acre uranium prospect on Grave Mountain in the Kettle River mountain range to its original holdings on Sherman Creek. Bulldozer stripping and drilling are planned. W. H. Marquette, mining engineer, is correlating information from an initial drilling program on the Sherman Creek claims. William M. Gail of Seattle is vice president.

*Dahl Uranium Mine, Inc.* has uncovered autunite veinlets in surface bulldozing of its holdings in the Mount Spokane district and ore-bearing zones in diamond drilling. Core and sludge recoveries were poor in initial holes; additional holes are planned. The company is using a new drilling machine designed by J. L. Havelick and manufactured by *General Machinery Company*. G. C. LaDow is president and Harwood J. Tibbits, secretary-treasurer.

*Northport Copper Company, Inc.* has been formed to mine a new copper discovery 15 miles west of Northport, Stevens County, Washington. The property is about five miles southwest of the *Velvet* mine which is a copper-gold producer. Exploration has been by bulldozer, and has revealed numerous veinlets of oxidized copper with indications of a larger ore body. Satisfactory assays have been obtained in copper and gold. The company has started diamond drilling operations. Incorporators were Joseph R. McNamee and William R. Schauls of Northport, and J. Everett Dobson of Millwood.

*Nine Mile Mining Company*, headed by A. L. Bradeen and Leslie Francis, president and secretary-treasurer, respectively, has found indications of tungsten at Eddes Mountain, seven miles from Republic, Washington. The occurrence was disclosed when the two were prospecting in the vicinity of Eddes Mountain at an old gold property. The property had been first worked 60 years ago; however, the mine tunnel is now partially caved and will have to be reopened. A five-mile road to the mine has been completed and a small mill is being installed. The company has made application for a DMEA loan to help finance activities.

*Mount Spokane Minerals and Uranium Company* has been formed by J. B. Pigott, J. W. Simons, and others of Spokane, Washington, to prospect holdings in the vicinity of Mount Spokane.

*Big Smoke Uranium, Inc.* of Spokane was incorporated at Olympia with capitalization of $600,000 to explore and develop more than 11,000 acres in Stevens County, Washington. Incorporators were Mrs. Martha Diehm, William O. Kumbera, and Lloyd A. White.

*U. & W. Uranium Company*, Spokane, has leased a showing of high-grade uranium ore north of Orient, northwestern Stevens County, Washington. A Spokane assaying firm tentatively identified the samples as uraninite. They reportedly were discovered by David A. Nogle of Spokane, a former schoolteacher who took up uranium prospecting a year ago. Spectographic tests also indicated presence of thorium, titanium, and some rare earths. The company also has leased acreage in the Mount Spokane uranium district and holds 50 mining claims in San Juan County, Utah. Thomas J. Linton is president.

A week-end prospecting venture started by members of a Spokane printing plant has resulted in formation of *Uranium Associates, Inc.*, with capitalization of $50,000. The firm was organized to develop land leased by the prospecting partners in the Mount Spokane uranium district. Frank H. Lawton is president and Gene Schumaker is secretary.

Everett J. Dobson, Millwood; Joseph R. McNamee, Northport prospector, and William Schauls, Northport, are organizing a company to take over development of their seven-claim copper prospect 15 miles west of Northport. They have put down a 40-foot shaft in oxidized copper ore and bulldozed a surface outcropping of the metal.

Uranium has been found on the Big Lick forest trail, Colville National Forest, northern Ferry County, Washington, by two loggers who took time out to prospect with a borrowed counter. The discoverers, Bert Edwards and Doug Elmes of Malo, together with William Kleinhans of Republic, have bulldozed a road to 10 claims. Their discovery set off a claim staking rush in the area. A radiometric report on samples taken from the area have shown 0.325 percent uranophane.

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## New Jersey Zinc Develops Flat Gap, Tennessee Mine

The New Jersey Zinc Company has started development work on its recently acquired Flat Gap property at Treadway, Tennessee, 25 miles from its Jefferson City property where a similar project has been underway for the past two years.

Shaft sinking operations are expected to begin shortly when installation of power facilities will have been completed. Two shafts are to be sunk—one for service, and the other for ventilation.

The orebody is a lead-free zinc sulfide ore, typical of the ore occurrences in eastern Tennessee. The mining technique to be employed at Flat Gap will be "trackless." All underground ore haulage will be by Diesel trucks, thus eliminating the need for tracks, mine cars, and mine locomotives. Trucks will also be used to transport concentrate from the proposed mill, which will treat 2,000 tons of zinc ore per day, to a railroad shipping point at Morristown, Tennessee.

Development of the two Tennessee mines is a part of a comprehensive program to increase the Company's ore supply for the years to come. Similar mine development work is underway at its properties in Pennsylvania and Virginia. Another mine in New Mexico has resumed production and a modernization program is nearing completion at still another mine in New Jersey.

*Calumet & Hecla, Inc.'s* threat to liquidate its mining operations in upper Michigan (See MINING WORLD, July 1955, page 87) was called off when the company settled a 16-week strike with the CIO United Steelworkers. The strike had idled 2,200 workers in the Calumet area, and had led to a company decision to terminate operations after a "final" offer was rejected by the union. Subsequent negotiations led to the new contract which provides 8 percent wage increases for all employes. Normal production has now been resumed.

*Edgemont Mining & Uranium Corporation* of Edgemont, South Dakota is conducting exploration work in northwestern Nebraska. Some good anomalies have been reported but the extent of any deposits has not yet been determined.

Final details are being worked out on the purchase of the *Victory* fluorspar mine in Hardin County, Illinois by the *Minerva Oil Company*. The property consists of 1,148 acres with a mill. Present plans are for Minerva's fluorspar division to mine the ore and ship it to the Crystal plant of Minerva. The Victory mill is not to be operated.

The *U. S. Atomic Energy Commission* reportedly has established a resident geologist at Dickinson, North Dakota.

*Reynolds Metals Company* has applied for a DMEA loan to explore the *Hamp* lease on the apex of the Hicks Dome in Hardin County, Illinois, for rare earths. A DMEA team is checking the property.

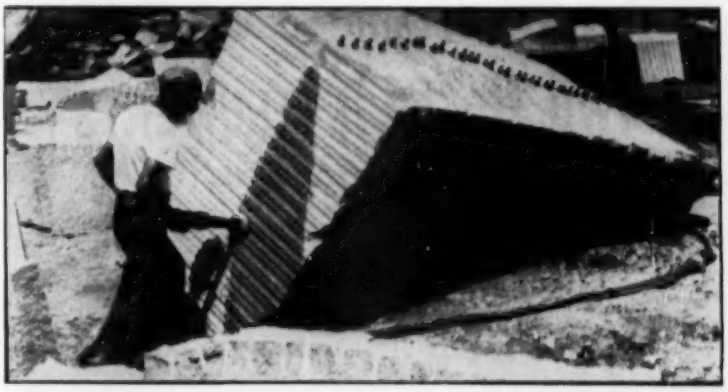
Although no uranium has yet been discovered in Oklahoma, the state legislature has prepared for the future by passing a bill which imposes a five percent gross production tax on any uranium that may be mined in the state.

Delmer L. Curtis and W. I. Johns, operators of an aerial photo service in Tulsa, Oklahoma, have been granted a permit to drill uranium prospect holes on the right-of-way of State Highway No. 11 by the state highway director, C. A. Stoldt. The area is ⅝ mile south of Walco in Osage County, between Avant and Barnsdall. The prospectors plan to drill 2⅛-inch holes 50 feet to test for uranium. Their permit prohibits use of explosives or interruption of traffic. Osage County mineral rights are held by the Osage Indians who became fabulously wealthy 25 years ago from several gusher-type oil wells.

The *Fluorspar Importers and Producers Institute* has been formed by a group of importers of fluorspar, some of whom have mines outside of the United States, to oppose the higher tarrifs and import quotas on fluorspar sought by many domestic producers. The new group believes that domestic reserves are inadequate to meet future demands, and that it would be unwise to limit imports of such a strategic material.

Two prospectors, Charles E. Freeman and Henry J. Walter, report a discovery of ilmenite-bearing sands on the northeast coast of Florida between Jacksonville and Fernandina Beach. The discoveries were made on state-owned land on which the two men have mineral leases. The area includes Amelia Island where *Union Carbide and Carbon Corporation* has had a field crew at work. (See MINING WORLD, September 1955, page 105 for details on this vicinity.) Soil analysis of this present discovery show large quantities of ilmenite, and smaller quantities of rutile, zircon, epidote, staurolite, kyanite, garnet, tourmaline, and monazite.

The *Domestic Mica Miners Association* has been formed at Spruce Pine, North Carolina by operators of some 80 mica mines delivering ore to the U.S. Mica Purchasing Depot at Spruce Pine. S. L. Phillips has been named chairman and Lewie Aldridge is secretary. The group has undertaken negotiations with government officials regarding changes in pricing policies. Two recommendations were unanimously agreed upon by Association members: first, that a request be made for a 25 percent increase in the price of the four smallest sizes of good-stained mica. This is based on estimates that miners costs have risen at least that much since sale prices were adopted in 1952. The second recommendation is that the miners accept a cut of 20 percent in prices under the B program which covers



### *Integral Steel Drilling at Vermont Quarry*

**The Rock of Ages quarry on Millstone Hill, Barre, Vermont, largest granite quarry in the world, has speeded up its drilling operations and cut production costs by converting to integral steel from the conventional carbon rod and detachable bit technique. Rock of Ages for years has been using channel drilling and lift holing to free huge blocks from the quarry bed. For easier handling these blocks are then segmented by vertical deep holing across the grain of the granite, followed by shallow plug holing. After each of the latter penetrations, wedges are tapped manually into the drill holes to complete the splits. Until last December (1954), deep hole drillers had been using traditional equipment—varying lengths of steel rods with carbide-tipped, detachable bits for a cutting edge. Then Clyde Belanger, production manager of the quarry, started an experiment in deep holing, using a TM-300 rock drill. This drill operated with an air pressure of 85 pounds and was equipped with Sandvik Coromant drill steel, supplied by Copco Eastern Ltd., with both rod and 1 5/16-inch tungsten carbide bit incorporated in one piece. Exhaustive tests conducted over a six-month period proved conclusively that the new method not only reduced drilling time by 20 percent but also saved more than one-third the usual cost of steel and bit purchase and maintenance. Rock of Ages is now using Sandvik Coromant drill steels in all deep holing operation and has also converted to this type of steel for both plug and lift-holing. It has been proven particularly efficient in the cutting yard, where in the picture above a man can be seen plug holing. Steel wedges on top of the block are tapped manually to complete the split. Using the Coromant plug steel in an Atlas Copco rock drill, three drillers now turn out the work which formerly required six.**

hand-cobbed mica. This recommendation is based on continuation of the B program as amended February 10, 1955. It would reduce the price of ruby mica in hand-cobbed from $600 to $450 a ton, based on good stained quality.

The Fourth National Clay Conference sponsored by the Clay Minerals Committee of the National Research Council will be held at the Pennsylvania State University October 10 through 13. The following topics will be given particular emphasis: mixed-layer clays; thermal transformations; and clay water systems.

The United States output of titanium mill products hit a new high in the second quarter of this year with a total of 941,602 pounds, a gain of 144,383 pounds over the first quarter of the year.

A uranium discovery has been reported near the village of Creswell in Caldwell County, Kentucky. Leases have been taken on the farms of Mark Dorris, Paul Vincent, Leonard Rustin, Howard Crider, W. P. Crider, and Denver Campbell by Charles L. Cassady, Ray and Dod Wilson, and Russell Gable, all of Marion, Kentucky. The leases cover about 600 acres.

Charles W. Massie, mining engineer of the *Virginia Department of Conservation & Development*, has predicted that manganese ore production in the state will just about double this year. In 1953, Virginia shipped 7,548 long tons averaging 42.44 percent manganese, and in 1954 20,240 long tons averaging 43.24 percent were shipped. This was the largest amount ever shipped from Virginia in any one year except 1887 when 21,008 long tons were shipped from the old *Crimora* mine in Augusta County.

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## IRON RANGES

Iron ore shipments down the Great Lakes continued above the 3,000,000-ton mark for the week ended September 5, and were only slightly below the 1955 record established in the preceding seven-day period. Shipments for the week ended September 5th totaled 3,077,295 tons, or 49 percent higher than the 2,070,100 tons in the same period of 1954. The new high set for 1955 was 3,164,011 gross tons for the week ended August 29. For the season to September 5, iron ore shipments total 56,729,590 tons, or 29 percent higher than the cumulative total of one year ago which was 43,890,996 tons.

*Oliver Iron Mining Division* of the *United States Steel Corporation* expects to begin mining operations on its unmined reserve holdings in the Virginia area of Minnesota, probably shortly after January 1. A company representative has informed St. Louis County officials of tentative plans to use sites held in reserve. Tow locations in the vicinity were mentioned as probable operations bases.

Ore production was suspended on July 26 at the *Inland Steel Company's Sherwood* property when water from *Cleveland-Cliff Iron Company's Spies* shaft began filling the Sherwood. Pumps were rushed in from *Calumet & Hecla's* operation (See MINING WORLD, September 1955, page 106), and then a booster pump was brought in from *Caland Ore Company* at Steep Rock Lake, Ontario. The pump helped dewatered shaft by the booster pump. Arrangements were then made to prevent further inflows of water through the damaged bulkhead from the east side of the Spies workings. At the Sherwood water was pumped from the workings and cleanup work undertaken. Maintenance crews were placed on a three-shift 24-hour basis to get mechanical and electrical equipment back in operation.

The *Oliver Iron Mining Division* of the *U. S. Steel Corporation*, following a practice started last year, is again conducting tours through its experimental taconite plant at Pilotac near Mountain Iron, Minnesota. Several hundred visitors each week are able to become more closely acquainted with the problems involved in producing an acceptable product from the low-grade ores on the Mesabi Range, and with the mining industry in general.

*Quincy Mining Company* has purchased the Tamarack dredge, *Calumet & Hecla's* original dredge constructed in 1913. It has been towed to the Quincy No. 1 sands section, and will eventually be moved to the No. 2 sands to replace the Quincy wooden hull dredge which will only be used intermittently thereafter.

## American Gilsonite to Use New "Jet" Mining Method

High pressure "jet" hydraulic mining will probably be employed at the $10,000,000 project of American Gilsonite Company in the Uintah Basin of Utah. The firm, an affiliate of Standard Oil Company of California and Barber Oil Corporation, believes that the 16,000,000 tons of gilsonite it owns in Uintah County can be profitably exploited. Production goal is between 600 and 700 tons daily of gilsonite from the 10-mile long Cowboy vein at Bonanza, Utah.

The jet hydraulic mining technique is new to the industry and is believed to be particularly applicable to the Cowboy vein, where the gilsonite is friable enough to be dislodged by hydraulic jet stream operating at a pressure of 2,300 pounds per square inch. First step in opening the vein will be to sink a vertical shaft. Then a drift will be driven on a 2.0 percent grade using a high pressure water line for the jet cutting stream and six-inch low pressure line carrying water to lead to the face of the drift. The dislodged gilsonite will flow back down the incline to the main shaft. A flume will collect the ore, fines and water will be reunited with the crushed gilsonite in a surge tank, and the product will be sent up to the surface. Miners will be working in nearly 100 percent humidity.

After one initial drift is completed, the jet cutting Jumbos, made by Gardner-Denver Company, will be returned to the position of the shaft, lowered 10 feet, and will begin cutting away at the floor of the old drift.

A group of California mining and oil men have reopened the *Gold King* mine near Gladstone, Colorado. The mine, owned by the *San Juan Gold King Mines* of Sioux City, Iowa, and under lease to *Colorado Gold King Mines, Inc.*, Silverton, Colorado, was one of the area's best producers at the turn of the century. A crew is working under the direction of C. W. Fleming to open up the first and seventh levels for a sampling program.

*Four Corners Uranium Corporation* has begun shipping uranium ore from its deposit in the Morrison hogback formation about 12 miles from Denver, Colorado near the town of Morrison. Production averaging from 50 to 100 tons per day is planned by president Eugene Sanders. Samples from the ore body, which was discovered last spring by Stanley and Richard Strauss, Cripple Creek, Colorado miners, range from 0.20 to 0.50 percent $U_3O_8$.

*Frontier Mining Company*, Denver, Colorado, is preparing to begin uranium production on its 250-acre lease in Boulder County, Colorado. The property is 4 miles west of Eldora, and the firm plans to ship ore to the AEC mill at Rifle, Colorado. Charles Bristle is president of the firm, which was formed last year by a group of airlines officials. Frontier Uranium also has property in Arizona and recently announced its first shipment of ore from its *Sunnyside* claims on the Navajo Indian Reservation.

*Cinderella Uranium & Oil, Inc.*, San Angelo, Texas has filed with the Securities and Exchange Commission in Denver, Colorado. The firm has claims in Montrose County, Colorado. Marvin C. Hanz is president.

*Continental Uranium, Inc.* and *Coliowa Uranium Corporation* are conducting a joint venture operation on 40 claims at Jamestown, Colorado, near Boulder. Autenite mineralization is reported on the property. The land will be mined in conjunction with gold and silver operations by Continental.

Expansion is underway at the *United States Vanadium Company* uranium processing plant at Uravan, Colorado, and the additional facilities will be in operation by the fall of 1956. The Uravan plant is one of the oldest and largest of the nine uranium processing mills now in existence. Increasing supplies of uranium-bearing ores in the region led to the proposed expansion of the plant.

The *Susan B Uranium Corporation*, Moab, Utah, has two drills operating on its La Sal Creek property in San Juan County, Utah. Through a farm-out arrangement with the *Bush Drilling Company* of Grand Junction, Colorado, it has completed preliminary drilling on part of the *Yellow Cat* claims in Grand County, Utah.

*Utex Exploration Company*, Moab, Utah, has installed an emission spectrograph to assist in the analysis of ores, drill cores, and samples in its Moab assay laboratory. The two-meter instrument was manufactured by *Applied Research Laboratories* and is capable of determining not only what elements are present in a given sample but also the quantity of each element.

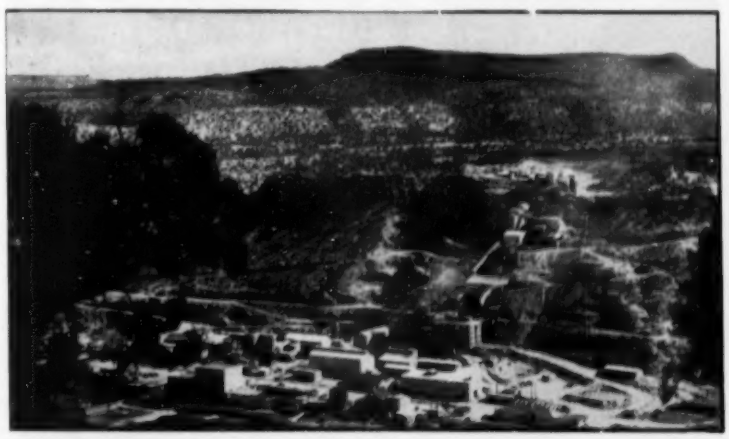
Jack Turner and the Mohler Brothers of Moab Utah have announced discovery of a uranium ore body, at Red Canyon, Utah. The new deposit is in the Shinarump formation and is located a few miles from the *Happy Jack* mine. *Chastain Bros. Drilling Company* and geologist Larry M. Buhler have been employed to develop the property.

*Utaco Uranium, Inc.*, is shipping ore from its Coalbed Canyon mine in San Juan County, Utah to the *Union Carbide Nuclear Company* mill at Uravan, Colorado.

*Standard Uranium Corporation* and *Col-U-Mex Uranium Corporation* are participating in a joint venture on Col-U-Mex's property in the Big Indian area of San Juan County, Utah. Operations will be under the management of Standard, and Charles A. Steen's *Moab Drilling Company* will conduct core drilling. Standard is also conducting an exploratory program on the nearby *Big Indian Venture*, a joint project with *Uranium Reduction Company*. Drilling of 51 holes is expected to cost $153,550.

*All State Uranium Corporation* has established headquarters in Moab, Utah. The firm has 108 claims in southeastern Utah. President is Frederick G. Stoye.

*Ranger Uranium Exploration and Development Company, Inc.* is stripping overburden from an outcrop of ore in the Shinarump formation at its property in



## Union Carbide Expands Uravan Uranium Mill

**Expansion at the Uravan, Colorado uranium processing mill of Union Carbide and Carbon Corporation is now underway as a result of a contract signed by Union Carbide Nuclear Company, newly formed atomic energy division of the firm, with the United States Atomic Energy Commission. The plant formerly was operated by the United States Vanadium Company, Union Carbide subsidiary, which relinquished its name to become part of the new division. All of Union Carbide's atomic activities have been consolidated in the new firm, which is headed by Kenneth Rush, a vice president in the parent organization. (For complete details on the new division, see Page 75.) Completion of the expansion project at the Uravan mill is expected by the fall of 1956. Colorado mining circles believe that capacity will be doubled at the mill, which is already one of the largest on the Colorado Plateau. Construction is being handled by Monument Construction Company of Grand Junction, Colorado and the J. A. Park Machinery Company, Pueblo, Colorado. R. D. Van Zante is Uravan superintendent. Union Carbide Nuclear Company also operates a uranium processing mill at Rifle, Colorado.**

the Uintah Basin, Uintah County, Utah. The company owns claims on the San Rafael Reef approximately 28 miles southwest of Green River, Utah, near Cisco, Utah, in Uintah County and in Moffat County, Colorado. President of the Ranger Company is William Daugherty, Vernal, Utah.

*Utavan Mines, Inc.*, a subsidiary of *Indian Mines, Ltd.*, has encountered ore in test holes sunk on the *Copperhead* uranium property near Blanding, Utah. Average thickness of the bed is 4.5 feet. Cost of development work is being shared by *Apache Uranium Mines, Inc.*, Salt Lake City.

*Yellow Queen Uranium Company*, Denver, Colorado, has acquired leases on 18 claims adjoining the *Lucky Strike* mine in the Henry Mountains, Utah. Drilling on claims in the Greenriver area has indicated mineralized areas up to 100 feet thick.

*Continental Uranium, Inc.*, and its wholly owned subsidiary, *Woodmont, Inc.*, shipped a total of 7,911 tons of uranium ore worth $309,460.78 to buying stations during the second quarter of 1955. Dollar value of ore shipped was decreased because of the opening of the new "Block B" ore body at *Continental Number One* mine, and grade of ore shipped by *Rattlesnake* mine was decreased because of terminal operations in the small stripping area used for a pilot study for the stripping program. Both mines are located in San Juan County, Utah.

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## WYOMING

Several shipments of the first asphaltic type uranium ore delivered to the AEC buying station at Riverton, Wyoming, have been made by the *Cheyenne Uranium & Mining Company*. The ore came from the firm's property in a highly faulted area along Beaver Rim near the Sand Draw oil field in central Wyoming. Only other known deposit of this kind is located at Temple Mountain, Utah.

*Colorado Fuel & Iron Corporation* has acquired mineral rights to approximately 8,000 acres in Goshen and Platte counties, Wyoming. The holdings include mining locations and purchased mineral rights in the Sunrise area, which has been the base of CF&I's iron ore operations since 1900.

A representative of *Calumet & Hecla, Inc.* reportedly has been in the Fremont county, Wyoming area examining uranium properties. To date, activities of the big iron mining company's uranium division have been confined to the New Mexico area.

A bed of uranium ore at least 600 feet wide, 500 feet deep and 70 feet thick has been uncovered by a stripping operation on the eastern end of the Hope No. 9 uranium claim in the Puddle Springs area of the Gas Hills in Wyoming. Holders of the lease to the claim and several others are *Noramo Associates*. (Normaco) Assays have indicated the ore will average about 2.0 percent $U_3O_8$. Extent of the ore is not yet known. Normaco is continuing to ship 800 tons of ore per month from the western end of the claim. According to general superintendent Schaheen, a production quota of several times that amount could be met easily, and several large stockpiles have already been accumulated.

Now shipping 800 tons a month of uranium ore blended from 0.22 to 0.25 percent $U_3O_8$ to the Riverton, Wyoming AEC buying station are *Noramco Associates*, Denver, Colorado, and *Upetco*, operators of the mine on the *Hope No. 9* claim in the Gas Hills area.

*Jubilee Mines* is now shipping uranium ore to the Edgemont, South Dakota buying station from its mine north of Devils Tower, Wyoming. The mine is owned by Ted Rounds, Sundance, Wyoming, and *Rushmore Oil and Uranium Company*.

Pumpkin Buttes in northeast Wyoming will be opened to uranium prospecting and development on November 17. The area was to have been opened to the public domain in May, after having been closed by the United States Atomic Energy Commission for two years, but the earlier order was cancelled at the request of ranchers who feared that damage to their lands would be caused by hordes of prospectors. The November opening date was set, because yearly grazing is usually completed by that time. Prospectors and miners in the area have formed the *Pumpkin Buttes Prospectors and Miners Association* to foster better relations with the ranchers. Lem A. Jonston, Gillette, Wyoming, is president. The organization seeks to establish legal entry onto lands leased by ranchers from the government.

## precipitates—SOUTHWEST

### ARIZONA

Actual shaft-sinking operations have been started at the *Christmas* mine, near Winkelman, Arizona, where the present shaft is to be deepened 700 feet below the 900-foot level of the mine. When the shaft is completed to the 1,600 level, crosscuts will be driven into the ore of the O'Carroll bed. Drifting and further diamond drilling will be done to determine the continuity and characteristics of the ore body. Information derived from this work is expected to determine future mining plans. During the second quarter of 1955, exploration work included drilling 6,406 feet of diamond drill holes, both surface and underground, and driving 394 feet of drifts and crosscuts on the 8th and 9th levels of the mine. Expenditures totaled $197,911. Development of the Christmas mine is being conducted by *Inspiration Consolidated Copper Company*, Inspiration, Arizona. Inspiration exercised its option to acquire *Riviera Mines Company's* lease and purchase option on the Christmas property earlier this year. Riviera retains a royalty interest in future production.

W. A. Murray, formerly of Washington, D. C., has leased the old *Congress* mine at Congress Junction, Arizona, from E. A. Colburn, Jr., and started preliminary work. He has built a road to a previously undeveloped section of the property and is investigating both the gold and uranium showings. Later, he proposes to conduct underground mining in the older portion of the mine.

The *Ray Mines Division, Kennecott Copper Corporation*, Ray, Arizona, has contracted with *Western-Knapp Engineering Company* of San Francisco for a leach-precipitate-float addition to its Hayden concentration mill. The new plant, scheduled for completion in the spring of 1957, is expected to make possible the recovery of approximately two additional pounds of copper for each ton of ore treated. Approximate cost of the installation, including sponge iron and sulphuric acid plants for the system, is $4,700,000. The leach-precipitate-float system, first tested in the pilot plants of Kennecott's Western Mining Division Research Center at Salt Lake City, is designed to recover oxide copper minerals from the Ray ores. Present recovery is limited to sulphide copper. The additional recovery, said A. P. Morris, general manager of the Ray Mines Division, will prolong the life of the Ray property, now in its 44th year of production, by making possible treatment of oxidized ores now uneconomic

*Bagdad Copper Company*, Bagdad, Arizona, during July and the first half of August accumulated a stockpile of concentrates which contained approximately 2,000,000 pounds of copper. According to J. C. Lincoln, president, the strike at the El Paso Smelter of *American Smelter and Refining Company* had prevented the sale of Bagdad's concentrates during that period. Bagdad, for the first six months of this year, reported a net profit of $539,122, equivalent to $1 a share. This compares with a net income of $79,038, equivalent to 15 cents a share in the corresponding period of 1954.

### CALIFORNIA

*Verdi Development Company* whose new uranium mill has started production near Rosamond, California, has recently acquired the assets of *Crystal Dome Uranium Company*. These include 12 tungsten mining claims in the Beauty Mountain area between Riverside and San Diego counties. The California State Division of Mines reports on the area indicate that the Beauty Mountain district is a promising tungsten area.

The Redwood City Council (California) has received two bids for permission to mine a mercury deposit in the city's Stulsaft Park. The first bid was made by Andres Oddstad who is already taking ore from the first discovery which was made on his adjoining Farm Hills subdivision. (See MINING WORLD, June 1955, page 97.) He offered the city a 50-50 split of the profits. The *Palo Alto Mining Corporation* submitted a bid of 10 percent of the gross sales on cinnabar mined and a 50-percent split of the net profits on the operations. No decision has been made by the council yet.

A new mineral, galeite, has been found in Searles Lake, a dry lake about 175 miles northeast of Los Angeles. The mineral has been named for William A. Gale, assistant to the vice president in charge of research for *American Potash & Chemical Corporation*, who was director of research at nearby Trona when traces of the mineral were first discovered. It appears as minute white hexagonal crystals with a maximum diameter of about one millimeter, and bears a resemblance to schairerite, to which it is closely related.

*Pick Laboratories*, a subsidiary of *Pick Uranium Company*, has moved from Grand Junction, Colorado to Saratoga, California.

*Western Mercury Mining Company* is rehabilitating the old *Cuddeback* quick-

## Consolidated Coppermines Will Do Its Own Mining Under New Expansion Program at Kimberly, Nevada

Development of a new open-pit copper mine is underway at Kimberly, Nevada where Consolidated Coppermines Corporation has been conducting an intensive churn drilling program that has proved additional ore reserves in the vicinity of the Brooks and Morris pits.

The exploration program has ensured continued operations for at least 10 to 12 years, so the company has decided to purchase its own ore and waste moving equipment. Prior to this, the company had contracted with the Isbell Construction Company of Reno to move the waste materials from the pits and to haul ore to the railroad. From there it was shipped to the huge concentrator and smelter at McGill, Nevada, owned and operated by Kennecott Copper Corporation.

The immediate availability of 22-ton Euclid rear-dump trucks and P&H shovels enabled the company to begin stripping operations shortly after the decision to purchase them was made. The speed with which the firm has worked is illustrated by these dates—on March 25, 1955, an intensive churn drilling exploration program was started; on July 5, actual stripping operations were begun.

Company engineers estimate that 50,000,000 tons of ore and waste will be removed to create the Tripp copper pit. This involves stripping an average of 20,000 tons of ore and waste daily for the first year, 7,000 tons of which will be ore. After the initial period, the stripping ratio will decrease somewhat. When fully developed, the pit will be approximately 3,200 feet long and 1,700 feet wide.

For the job, Consolidated Coppermines purchased three P&H shovels and 14 Euclid trucks. Maintenance and servicing of the fleet is under the direction of Tom Gilmour, master mechanic. Garage installations have been constructed, and additional facilities will care for motor and transmission repairs. A complete parts department is available, a necessity in this comparatively remote area.

Key personnel for this project are under the direction of A. J. O'Connor, vice president and general manager. J. Frank Sharp is superintendent of operations; W. J. Latvala is superintendent of pit operations; John Eaby, chief clerk; J. M. Forbes, chief geologist; Harry Brindle, chief mining engineer; and M. Shields, chief electrician.

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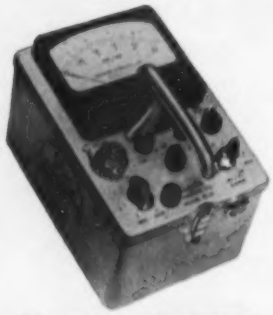

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## SOUTHWEST

silver mine near Tehachapi, 30 miles east of Bakersfield, California. New machinery is being installed at the mine and plans are to retort the ore on the grounds by means of an electric furnace. In charge at the mine is C. T. Palladine. Associated with him in the firm are Alfred and Bennet Siemon, Allen F. Grant, Frank Guida, and M. S. Bibbins. The mine was once known as the *Walibu*.

Robert and Henry Hinton of Santa Barbara, California have purchased 14 uranium claims in the Newberry-Ord area near Barstow. The claims were owned by Don Cederlof, Lucky Likens, and Elmer Perry.

The *Basic Minerals Syndicate* of Salt Lake City, Utah has purchased a channel mining gold property 84 miles northeast of Sacramento, California from Ella Maria Wickam and Otto Brink for $200,000 and "other considerations." The mine was first worked in 1851. Mining operations follow the channel of a buried river bed which narrows in places to a width of eight to nine feet, four feet high, and sometimes widens to several 10's of feet. The firm has also purchased 15 cinnabar claims located near Newman in Stanislaus County, California. Both properties were purchased for *Twentieth Century Minerals*, a company now being formed to operate gold, uranium, and mercury mines in several Western states.

## NEVADA

Ralph O. Bradley, Briant G. Badger, and James C. Trisoliere have sold a 55 percent interest in their *Diamond Jim* mine 75 miles north of Elko, Nevada, to the *United States Smelting, Refining and Mining Company* for $100,000. The property totals 37 claims on approximately 600 acres. USSRM will operate the mine, while Mr. Bradley, Mr. Badger, and Mr. Trisoliere will retain a 45 percent interest. In addition, Mr. Trisoliere who relocated the original lead-silver vein, will be mine superintendent.

*Homestake Mining Company*, one of the largest gold producing companies in the United States, has recently acquired a lease and option on 18 uranium claims in the Virginia Mountains, about 32 miles north of Reno, Nevada. The property is held by Fred and Galen DeLongchamps.

*Tonopah Mining Company* of Nevada, which has operated exclusively as an investment firm for a number of years,


**Thickener** 28x10 Dorr, steel tank, low head, enclsd gear & 440-v gearmotor
**Thickeners** 3 Dorr 26-8 mechanisms as above, but without tanks
**Ball Mill** 6 ft dia. x 7 ft. Hendy with 125 hp 440-v slipring motor, etc.
**Ball Mill** 5 ft. dia. x 4 ft. Straub with 50 hp 440-v motor, etc.
**Classifier** 60"x25' Dorr DSF dplx rake
**Classifier** 48"x13'4" WEMCo duplex rake
**Crusher** 24x36 Pioneer, with new parts
**Crusher** 15x24 Cedar Rpds roller-brg
**Locomotives** Mancha and Atlas 1½ ton
**Muckers** Eimco Model 12-B, 18" ga.

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will re-enter the mining field through a newly formed subsidiary, *Tonopah Exploration Company, Inc.*

Mrs. Inez Butler, Pershing County, Nevada, mining woman, has made several sales within the last few months. She sold the *Rainy Day* group of 12 tungsten claims in the Pyramid Lake area to E. V. Storey of Boise, Idaho for her son, Glen Gilbert, and Del Gilliland for $300,000. Mrs. Butler also sold Mr. Storey a group of six quicksilver claims on Mt. Tobin for Walter Low, and sold five of her own quicksilver claims in the *Rainbow* group to Sparkie Saranto of Reno.

Roy and Joe Hunter and Lyle Hagler, all of Visalia, California, are currently developing and producing placer gold on the *Willow Creek* group of claims south of Winnemucca, Nevada. These placers range from 20 to 30 feet in depth. Bottom gravel averages 0.25 ounce gold per cubic yard. Gold is generally quite coarse. Recently a 10-ounce nugget was recovered. They are using a ¾-yard Bucyrus-Erie No. 22-B dragline.

Hank Thacker of Imlay, Nevada is currently operating a Skyline stationary dragline with a one-yard bucket in lower Willow Creek south of Winnemucca, Nevada. Water is scarce but adequate, being reused by storing in several ponds. Gravels being worked are 15 to 25 feet deep with values in the bottom six inches. The placer gold is mostly coarse.

The *Barber Mining Company* of Winnemucca, Nevada is operating a dredge on gold placers southeast of Imlay. The Doodle Bug dredge is of original design somewhat similar to a Bodison, and was moved from Stockton, California for the work. Present operations in Barber Canyon average 500 yards of gravel a day, working one shift. There is ample water from three nearby sources. Irving Lunt is president and George Wahlgren is general manager of the operation.

## NEW MEXICO

*International Minerals & Chemical Corporation* will build a new $250,000 office building at its potash mine and refinery near Carlsbad, New Mexico. Work starts immediately and will be completed by March 1956.

*Sabre Uranium Corporation* of Grand Junction, Colorado, has made a substantial unranium find on its property 17 miles north of Grants, New Mexico, but extent and value have not been disclosed.

*Southwest Potash Corporation* reportedly has undertaken a $2,500,000 expansion program which will increase production of its mine and mill near Carlsbad, New Mexico, by one-third. The present 3,000-ton mill is being increased to 4000-tons daily capacity, with new production scheduled to start in February 1956.

*Yucca Uranium Company* of Albuquerque, New Mexico, has shipped an 80-ton pilot run of ore to the *Anaconda Company's* mill at Bluewater from its recently acquired mine north of Prewitt. A drilling program now being conducted on the property reportedly has disclosed the presence of at least 40,000 tons of commercial grade ore. Yucca recently acquired 72 more claims in the area from *Blew Mining Company*. It has also been shipping ore from its *Cedar Group No. 1* mine four miles northeast of Grants.

*Defense Metal Mining Company* of Vanadium, New Mexico, has announced plans for immediate development of uranium, lead, zinc, and silver claims 23 miles west of Lordsburg. President of the firm is General Leland W. Miller, U.S.A.F., retired.

The Socorro Assay Laboratory has been opened on Park Street in Socorro, New Mexico, for the convenience of the mining and milling industry in and around Socorro County.

## TEXAS

*Southwest Assays, Inc.* has opened a laboratory at the International Airport in San Antonio, Texas, and is now furnishing uranium assays. Vice president and general manager Howard L. Grant reports that they have adopted and are using exclusively the chemical procedure used in buying ore for the A.E.C.

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Continued from page 65

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Let's not forget the ladies, either. Coffee will be served daily in the Wishing Well Room of the New Frontier Hotel where you can arrange to meet your friends. A tour of the Dam and its facilities has been arranged, and of course the ladies are welcome on the field trips mentioned above. A Ladies Welcoming Lunch will be served beside the pool of the Hotel Riviera on Monday; a Brunch and fashion show will be held at the Congo Room of the Hotel Sahara on Tuesday. Be sure to bring your summer clothes—it should be warm.

Only one evening entertainment function is planned by the Congress this year, since the delegates will certainly have their own ideas about how to spend their free time. This is the bang-up western barbecue and party to be held at the Last Frontier Village just across the way from the Silver Slipper meeting hall. Here there will be some real western music and a huge old-time barbecue pit. In between trips to the chow line you can wander through the famous collection of old time stage coaches, covered wagon, and trains of the '80's, the town's typical western jail, museums, and a $100,000 gun collection.

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**Herbert J. French,** 62, vice president of the International Nickel Company, Inc., died during August in Rochester, Minnesota. He was also assistant vice president of International Nickel Co. of Canada. He joined INCO in 1929 as a member of the metallurgical staff at the Bayonne, New Jersey, laboratory and spent many years at the firm's offices in New York City.

**Edwin Letts Oliver,** 77, founder-chairman of Dorr-Oliver, Inc., died August 28 at his summer home at Lake Tahoe, California. Best known for his work in the field of continuous filtration, Mr. Oliver's career in metallurgy spanned more than half a century. He formed Oliver United Filters, Inc. in 1928 and served as its president until 1954 when it merged with the Dorr Company. He was one of the founders of the Idaho-Maryland gold mine in California and was a recipient of the James Douglas Medal awarded by the American Institute of Mining & Metallurgical Engineers.

**Estey A. Julian,** 73, president of the American Chrome Company, died during August in Addis Ababa, Ethiopia, where he had been negotiating with the Ethiopian government for mineral exploration rights on behalf of the American owned Goldfield Consolidated Mines. Mr. Julian began his professional career in the Cripple Creek gold area of Colorado and in 1907 became mill superintendent for the Tonopah Mining Company, Tonopah, Nevada. He was named vice president and general manager of Consolidated Goldfields in 1919. During the 1930's he was manager of the Livengood Placer project in Alaska. During recent years he had maintained offices in San Francisco, California.

**Morris F. LaCroix,** 67, president of Copper Range Company, died July 28 at his home near Brookline, Massachusetts. Responsible for planning and developing the $70,000,000 White Pine Copper Project and an outstanding proponent of the development of low-grade ores on the Upper Michigan Peninsula, Mr. LaCroix was recognized throughout the industry as a leader both in engineering and administrative phases. The community of White Pine, in recognition of his part in establishing the copper project and townsite of 2,000 people, recently held a "Morris LaCroix Day" celebration. He was a member of the American Institute of Mining and Metallurgical Engineers and the Society of Military Engineers.

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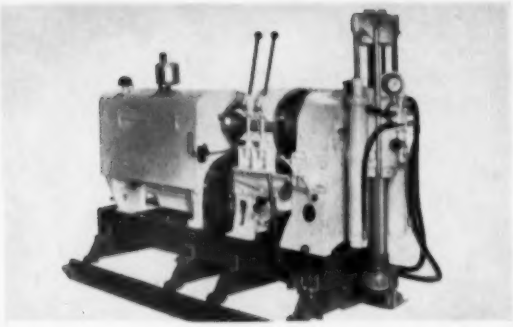

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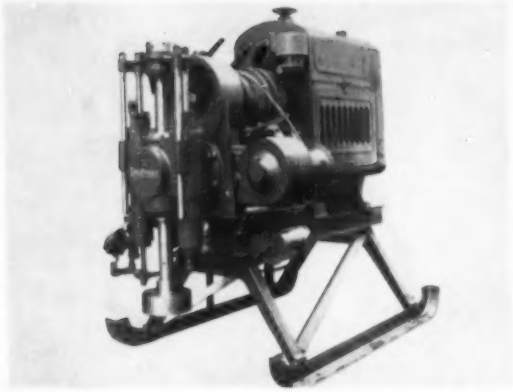

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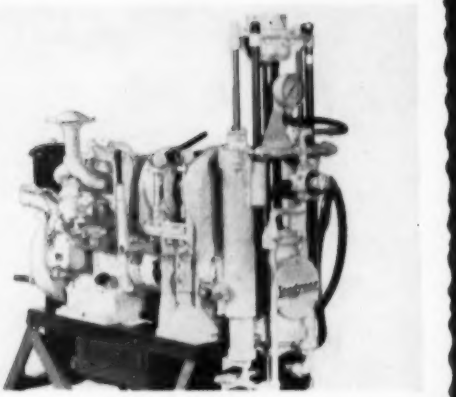

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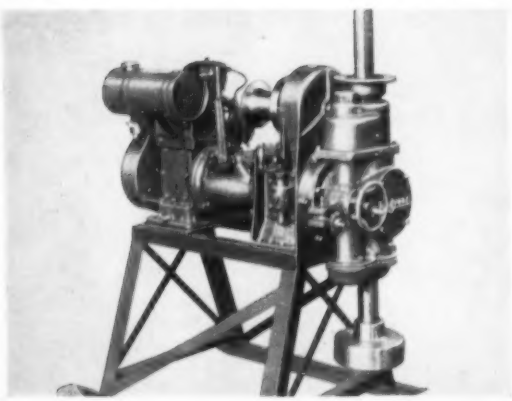

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